Synthetic Derivations

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Abstract

750 model outputs considered in the manual evaluation. 50 Static derivations per model, 4 perturbations per Static derivation (direct mapping), 3 models.

1 Ground Truth References

1.1 Perturbation: static

1.1.1 Derivation 0

$$\eta(a) = e^{a} \tag{1}$$

$$\frac{d}{da}\eta(a) = \frac{d}{da}e^{a} \tag{2}$$

$$\frac{d}{da}\eta(a) = e^{a} \tag{3}$$

$$\frac{d}{da}\eta(a) = \eta(a) \tag{4}$$

$$\eta(a)\frac{d}{da}\eta(a) = \eta^{2}(a) \tag{5}$$

$$\frac{d}{da}\eta(a) = \frac{d^{2}}{da^{2}}\eta(a) \tag{6}$$

$$\eta(a)\frac{d^{2}}{da^{2}}\eta(a) = \eta^{2}(a) \tag{7}$$

1.1.2 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{8}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d^{2}}{d\mathbf{s}^{2}}\sin\left(\mathbf{s}\right) \tag{9}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{10}$$

$$\frac{d^{2}}{d\mathbf{s}^{2}}\sin\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{11}$$

1.1.3 Derivation 2

$$\mathbb{I}(\Psi_{\lambda}) = e^{\Psi_{\lambda}} \tag{12}$$

$$\int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \int e^{\Psi_{\lambda}}d\Psi_{\lambda} \tag{13}$$

$$\Psi_{\lambda} + \int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \Psi_{\lambda} + \int e^{\Psi_{\lambda}}d\Psi_{\lambda} \tag{14}$$

$$\Psi_{\lambda} + \int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \Psi_{\lambda} + \chi + e^{\Psi_{\lambda}} \tag{15}$$

$$\Psi_{\lambda} + \int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \Psi_{\lambda} + \chi + \mathbb{I}(\Psi_{\lambda}) \tag{16}$$

1.1.4 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{17}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{18}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^{2}}{2} + \hat{x}_0\mathbf{r}) \tag{19}$$

$$\hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^{2}}{2} + \hat{x}_0\mathbf{r}) \tag{20}$$

1.1.5 Derivation 4

$$\mathrm{V}_{\mathbf{B}}\left(P_{e}\right) = \sin\left(P_{e}\right) \tag{21}$$

$$\frac{d}{dP_{e}}\mathrm{V}_{\mathbf{B}}\left(P_{e}\right) = \frac{d}{dP_{e}}\sin\left(P_{e}\right) \tag{22}$$

$$\frac{d}{dP_{e}}\mathrm{V}_{\mathbf{B}}\left(P_{e}\right) = \cos\left(P_{e}\right) \tag{23}$$

$$\frac{d}{dP_e}\sin\left(P_e\right) = \cos\left(P_e\right) \tag{24}$$

$$\frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{25}$$

$$-1 + \frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = -1 + \frac{\cos\left(P_e\right)}{P_e} \tag{26}$$

1.1.6 Derivation 5

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \int (\mathbf{J} + \mathbf{v}) d\mathbf{J} \tag{27}$$

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f \tag{28}$$

$$\frac{\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right)}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \tag{29}$$

$$\frac{\int (\mathbf{J} + \mathbf{v}) d\mathbf{J}}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \tag{30}$$

1.1.7 Derivation 6

$$\mathbf{M}(J) = \cos\left(J\right) \tag{31}$$

$$\int \mathbf{M}(J) dJ = \int \cos\left(J\right) dJ \tag{32}$$

$$\int \mathbf{M}(J) dJ = F_g + \sin\left(J\right) \tag{33}$$

$$F_g + \sin\left(J\right) = \int \cos\left(J\right) dJ \tag{34}$$

$$(F_g + \sin\left(J\right))^{F_g} = (\int \cos\left(J\right) dJ)^{F_g} \tag{35}$$

$$2(F_g + \sin\left(J\right))^{F_g} = (F_g + \sin\left(J\right))^{F_g} + (\int \cos\left(J\right) dJ)^{F_g} \tag{36}$$

$$\int 2(F_g + \sin\left(J\right))^{F_g} dF_g = \int ((F_g + \sin\left(J\right))^{F_g} + (\int \cos\left(J\right) dJ)^{F_g}) dF_g \tag{37}$$

1.1.8 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{38}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{39}$$

$$F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = F_c\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{40}$$

$$\int F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) dF_c = \int F_c\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) dF_c \tag{41}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{42}$$

$$\int F_c \cos\left(\mathbf{p}\right) dF_c = \int F_c\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) dF_c \tag{43}$$

1.1.9 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{44}$$

$$\frac{\partial}{\partial\varphi}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = \frac{\partial}{\partial\varphi}(-\sigma_x + \varphi) \tag{45}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = \frac{\partial^2}{\partial\varphi^2}(-\sigma_x + \varphi) \tag{46}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{47}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)} = 1 \tag{48}$$

$$(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)})^{\sigma_x} = 1 \tag{49}$$

1.1.10 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) \tag{50}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{51}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{d}{d\phi}1 \tag{52}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) = \frac{d}{d\phi}1 \tag{53}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) = \frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) \tag{54}$$

$$0 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) \tag{55}$$

$$0 = \frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) \quad (56)$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi)-1 \quad (57)$$

1.1.11 Derivation 10

$$\theta(q) = \cos(q) \quad (58)$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos(q) \quad (59)$$

$$\frac{d}{dq}\theta(q) = -\sin(q) \quad (60)$$

$$-\sin(q) = \frac{d}{dq}\cos(q) \quad (61)$$

$$(-\sin(q))^q = (\frac{d}{dq}\cos(q))^q \quad (62)$$

$$(-\sin(q))^{2q} = (-\sin(q))^q(\frac{d}{dq}\cos(q))^q \quad (63)$$

1.1.12 Derivation 11

$$\mathrm{r}_0(\lambda, g) = \frac{\partial}{\partial g}(\lambda + g) \quad (64)$$

$$\frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) = \frac{\partial^2}{\partial g^2}(\lambda + g) \quad (65)$$

$$\frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) = 0 \quad (66)$$

$$\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) = \frac{d}{d\lambda}0 \quad (67)$$

$$(\lambda + g)\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) = (\lambda + g)\frac{d}{d\lambda}0 \quad (68)$$

1.1.13 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log(\mathbf{g}) \quad (69)$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log(\mathbf{g}) \quad (70)$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \quad (71)$$

$$\cos(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})) = \cos(\frac{1}{\mathbf{g}}) \quad (72)$$

$$\cos(\frac{d}{d\mathbf{g}}\log(\mathbf{g})) = \cos(\frac{1}{\mathbf{g}}) \quad (73)$$

1.1.14 Derivation 13

$$\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = \frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \quad (74)$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = \mathbf{P}\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \quad (75)$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = Q\mathbf{P} \quad (76)$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J)) = Q\mathbf{P} - \cos(\sin(J)) \quad (77)$$

$$\frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J))}{J} = \frac{Q\mathbf{P} - \cos(\sin(J))}{J} \quad (78)$$

1.1.15 Derivation 14

$$\mathrm{a}^{\dagger}(u) = \cos(u) \quad (79)$$

$$\frac{d}{du}\mathrm{a}^{\dagger}(u) = \frac{d}{du}\cos(u) \quad (80)$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^u = (\frac{d}{du}\cos(u))^u \quad (81)$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^u = (-\sin(u))^u \quad (82)$$

$$(\frac{d}{du}\cos(u))^u = (-\sin(u))^u \quad (83)$$

$$\frac{d}{du}(\frac{d}{du}\cos(u))^u = \frac{d}{du}(-\sin(u))^u \quad (84)$$

1.1.16 Derivation 15

$$\mathrm{A}_2(\hat{H}, \mathbf{B}) = \log(\mathbf{B}^{\hat{H}}) \quad (85)$$

$$\hat{H}_{\lambda}(y) = \cos(y) \quad (86)$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial\hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} = \frac{\cos(y)}{\frac{\partial}{\partial\hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} \quad (87)$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial\hat{H}}\log(\mathbf{B}^{\hat{H}})} = \frac{\cos(y)}{\frac{\partial}{\partial\hat{H}}\log(\mathbf{B}^{\hat{H}})} \quad (88)$$

$$\frac{\hat{H}_{\lambda}(y)}{\log(\mathbf{B})} = \frac{\cos(y)}{\log(\mathbf{B})} \quad (89)$$

$$(\frac{\hat{H}_{\lambda}(y)}{\log(\mathbf{B})})^y = (\frac{\cos(y)}{\log(\mathbf{B})})^y \quad (90)$$

1.1.17 Derivation 16

$$f(C_d) = C_d \tag{91}$$

$$\frac{d}{dC_d} f(C_d) = \frac{d}{dC_d} C_d \tag{92}$$

$$\frac{d}{dC_d} f(C_d) = 1 \tag{93}$$

$$1 = \frac{1}{\frac{d}{dC_d} f(C_d)} \tag{94}$$

$$1 = \frac{1}{\frac{d}{dC_d} C_d} \tag{95}$$

$$1 = \frac{1}{\frac{d}{df(C_d)} f(C_d)} \tag{96}$$

1.1.18 Derivation 17

$$\hat{X}(f') = \cos(f') \tag{97}$$

$$\frac{d}{df'} \hat{X}(f') = \frac{d}{df'} \cos(f') \tag{98}$$

$$\frac{d^2}{d(f')^2} \hat{X}(f') = \frac{d^2}{d(f')^2} \cos(f') \tag{99}$$

$$\frac{d^2}{d(f')^2} \hat{X}(f') = -\cos(f') \tag{100}$$

$$\frac{\frac{d^2}{d(f')^2} \hat{X}(f')}{\mathrm{P_e}(f')} = -\frac{\cos(f')}{\mathrm{P_e}(f')} \tag{101}$$

1.1.19 Derivation 18

$$W(P_e) = \log(P_e) \tag{102}$$

$$\frac{d}{dP_e} W(P_e) = \frac{d}{dP_e} \log(P_e) \tag{103}$$

$$\frac{d}{dP_e} W(P_e) = \frac{1}{P_e} \tag{104}$$

$$\frac{d}{dP_e} \log(P_e) = \frac{1}{P_e} \tag{105}$$

$$\int \frac{d}{dP_e} \log(P_e) dP_e = \int \frac{1}{P_e} dP_e \tag{106}$$

1.1.20 Derivation 19

$$\mathrm{E}_\lambda(\hat{H}_l) = \int e^{\hat{H}_l} d\hat{H}_l \tag{107}$$

$$0 = -\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l \tag{108}$$

$$0 = (-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l) \int e^{\hat{H}_l} d\hat{H}_l \tag{109}$$

$$0 = ((-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l)^2) \int e^{\hat{H}_l} d\hat{H}_l \tag{110}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 \tag{111}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{112}$$

1.1.21 Derivation 20

$$\mathrm{n}_2(V_{\mathbf{B}}, \mu_0) = \cos(V_{\mathbf{B}} + \mu_0) \tag{113}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = \int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 \tag{114}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{115}$$

$$\int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{116}$$

1.1.22 Derivation 21

$$\mathrm{E_n}(S) = \int e^S dS \tag{117}$$

$$\mathrm{E_n}(S) = x + e^S \tag{118}$$

$$x + e^S = \int e^S dS \tag{119}$$

$$x + e^S = T + e^S \tag{120}$$

$$\int (x + e^S) dT = \int (T + e^S) dT \tag{121}$$

$$\int \mathrm{E_n}\left(S\right) dT = \int (T + e^{S}) dT \tag{122}$$

$$\int \mathrm{E_n}\left(S\right) dT = \frac{T^{2}}{2} + T e^{S} + \psi^{*} \tag{123}$$

$$\frac{T^{2}}{2} + T e^{S} + \psi^{*} = \int (T + e^{S}) dT \tag{124}$$

$$\frac{T^{2}}{2} + T e^{S} + \psi^{*} = \frac{T^{2}}{2} + T e^{S} + t_{2} \tag{125}$$

1.1.23 Derivation 22

$$\mathrm{A_x}\left(Z, \rho\right) = \frac{\partial}{\partial \rho} Z \rho \tag{126}$$

$$\mathrm{A_x}\left(Z, \rho\right) = Z \tag{127}$$

$$Z + \mathrm{A_x}\left(Z, \rho\right) = Z + \frac{\partial}{\partial \rho} Z \rho \tag{128}$$

$$Z + \rho + \mathrm{A_x}\left(Z, \rho\right) = Z + \rho + \frac{\partial}{\partial \rho} Z \rho \tag{129}$$

$$\int (Z + \rho + \mathrm{A_x}\left(Z, \rho\right)) d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z \rho) d\rho \tag{130}$$

$$\int (2Z + \rho) d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z \rho) d\rho \tag{131}$$

$$\frac{\partial}{\partial Z} \int (2Z + \rho) d\rho = \frac{\partial}{\partial Z} \int (Z + \rho + \frac{\partial}{\partial \rho} Z \rho) d\rho \tag{132}$$

1.1.24 Derivation 23

$$\mathbf{p}(\phi) = \cos\left(e^{\phi}\right) \tag{133}$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos\left(e^{\phi}\right) d\phi \tag{134}$$

$$\iint \mathbf{p}(\phi) d\phi d\phi = \iint \cos\left(e^{\phi}\right) d\phi d\phi \tag{135}$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}\left(e^{\phi}\right) \tag{136}$$

$$\int \cos\left(e^{\phi}\right) d\phi = \omega + \mathrm{Ci}\left(e^{\phi}\right) \tag{137}$$

$$\iint \cos\left(e^{\phi}\right) d\phi d\phi = \int (\omega + \mathrm{Ci}\left(e^{\phi}\right)) d\phi \tag{138}$$

$$\frac{d}{d\phi} \iint \mathbf{p}(\phi) d\phi d\phi = \frac{d}{d\phi} \iint \cos\left(e^{\phi}\right) d\phi d\phi \tag{139}$$

$$\frac{d}{d\phi} \iint \mathbf{p}(\phi) d\phi d\phi = \frac{\partial}{\partial \phi} \int (\omega + \mathrm{Ci}\left(e^{\phi}\right)) d\phi \tag{140}$$

1.1.25 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{141}$$

$$\int y(A_x) dA_x = \int \frac{1}{A_x} dA_x \tag{142}$$

$$\int y(A_x) dA_x = \varepsilon_0 + \log\left(A_x\right) \tag{143}$$

$$\int \frac{1}{A_x} dA_x = \varepsilon_0 + \log\left(A_x\right) \tag{144}$$

$$\int \frac{1}{A_x} dA_x - \frac{x}{A_x} = \varepsilon_0 + \log\left(A_x\right) - \frac{x}{A_x} \tag{145}$$

$$\frac{\partial}{\partial x}(\int \frac{1}{A_x} dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\varepsilon_0 + \log\left(A_x\right) - \frac{x}{A_x}) \tag{146}$$

1.1.26 Derivation 25

$$\theta_1(g) = e^{g} \tag{147}$$

$$\int \theta_1(g) dg = \int e^{g} dg \tag{148}$$

$$(\int \theta_1(g) dg)^{g} = (\int e^{g} dg)^{g} \tag{149}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^{g} = \frac{d}{dg}(\int e^{g} dg)^{g} \tag{150}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^{g} = \frac{\partial}{\partial g}(\mathbf{g} + e^{g})^{g} \tag{151}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^{g})^{g} = \frac{d}{dg}(\int e^{g} dg)^{g} \tag{152}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^{g} = \frac{d}{dg}(\int e^{g} dg)^{g} \tag{153}$$

1.1.27 Derivation 26

$$\chi(P_e) = \cos(P_e) \tag{154}$$

$$\int \chi(P_e)dP_e = \int \cos(P_e)dP_e \tag{155}$$

$$\frac{d}{dP_e}\int \chi(P_e)dP_e = \frac{d}{dP_e}\int \cos(P_e)dP_e \tag{156}$$

$$\frac{d}{dP_e}\int \chi(P_e)dP_e = \frac{\partial}{\partial P_e}(\psi + \sin(P_e)) \tag{157}$$

$$\frac{\partial}{\partial P_e}(\psi+\sin(P_e)) = \frac{d}{dP_e}\int \cos(P_e)dP_e \tag{158}$$

1.1.28 Derivation 27

$$\phi(x') = \int \log(x')dx' \tag{159}$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log(x')dx' \tag{160}$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \tag{161}$$

$$\mathrm{t}_1(x', n_2) = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \tag{162}$$

$$\mathrm{t}_1(x', n_2) = \frac{d}{dx'}\phi(x') \tag{163}$$

$$\mathrm{t}_1(x', n_2)e^{-\frac{d}{dx'}\phi(x')} = e^{-\frac{d}{dx'}\phi(x')}\frac{d}{dx'}\phi(x') \tag{164}$$

1.1.29 Derivation 28

$$f(t_1) = e^{t_1} \tag{165}$$

$$\frac{d}{dt_1}f(t_1) = \frac{d}{dt_1}e^{t_1} \tag{166}$$

$$\frac{d}{dt_1}f(t_1) = e^{t_1} \tag{167}$$

$$\frac{d}{dt_1}f(t_1) = \frac{d^2}{dt_1^2}f(t_1) \tag{168}$$

$$(\frac{d}{dt_1}f(t_1))^2 = (\frac{d^2}{dt_1^2}f(t_1))^2 \tag{169}$$

$$(\frac{d}{dt_1}f(t_1))^4 = (\frac{d^2}{dt_1^2}f(t_1))^4 \tag{170}$$

1.1.30 Derivation 29

$$q(c_0) = e^{c_0} \tag{171}$$

$$\int q(c_0)dc_0 = \int e^{c_0}dc_0 \tag{172}$$

$$e^{-c_0}\int q(c_0)dc_0 = e^{-c_0}\int e^{c_0}dc_0 \tag{173}$$

$$e^{-c_0}\int q(c_0)dc_0 = (n + e^{c_0})e^{-c_0} \tag{174}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + q(c_0)}{q(c_0)} \tag{175}$$

1.1.31 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{176}$$

$$b^{A_x}(A_x, i) = (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} \tag{177}$$

$$b^{A_x}(A_x, i) - (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} = 0 \tag{178}$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \tag{179}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{180}$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i}di = \int 0di \tag{181}$$

1.1.32 Derivation 31

$$A(\mathbf{P}) = \int \log(\mathbf{P})d\mathbf{P} \tag{182}$$

$$A(\mathbf{P}) = \mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 \tag{183}$$

$$\int \log(\mathbf{P})d\mathbf{P} = \mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 \tag{184}$$

$$(\int \log(\mathbf{P})d\mathbf{P})^{\theta_1} = (\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{185}$$

$$(\int \log(\mathbf{P})d\mathbf{P})^{\theta_1} = A^{\theta_1}(\mathbf{P}) \tag{186}$$

$$A^{\theta_1}(\mathbf{P}) = (\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{187}$$

$$\frac{\partial}{\partial\theta_1}A^{\theta_1}(\mathbf{P}) = \frac{\partial}{\partial\theta_1}(\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{188}$$

1.1.33 Derivation 32

$$\mathrm{P_e}\,(\dot{z}) = \sin{(\dot{z})} \tag{189}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \frac{d}{d\dot{z}}\sin{(\dot{z})} \tag{190}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \cos{(\dot{z})} \tag{191}$$

$$\sin{(\dot{z})}\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \sin{(\dot{z})}\cos{(\dot{z})} \tag{192}$$

$$\mathrm{P_e}\,(\dot{z})\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \mathrm{P_e}\,(\dot{z})\cos{(\dot{z})} \tag{193}$$

1.1.34 Derivation 33

$$\mathbf{J}(\mathbf{A}) = \sin{(e^{\mathbf{A}})} \tag{194}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = \frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} \tag{195}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = e^{\mathbf{A}}\cos{(e^{\mathbf{A}})} \tag{196}$$

$$\frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} = e^{\mathbf{A}}\cos{(e^{\mathbf{A}})} \tag{197}$$

$$e^{-\mathbf{A}}\frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} = \cos{(e^{\mathbf{A}})} \tag{198}$$

1.1.35 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{199}$$

$$\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial\mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{200}$$

$$\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{201}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \tag{202}$$

1.1.36 Derivation 35

$$\lambda(V) = V \tag{203}$$

$$1 = \frac{V}{\lambda(V)} \tag{204}$$

$$\frac{d}{dV}1 = \frac{d}{dV}\frac{V}{\lambda(V)} \tag{205}$$

$$\frac{d}{dV}1 - \frac{d}{dV}\frac{V}{\lambda(V)} = 0 \tag{206}$$

$$\frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} = 0 \tag{207}$$

$$\frac{\frac{d}{dV}V}{V} - \frac{1}{V} = 0 \tag{208}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} = 0 \tag{209}$$

1.1.37 Derivation 36

$$\mathrm{f}'\,(\dot{z}, V, A) = A + V - \dot{z} \tag{210}$$

$$\int \mathrm{f}'\,(\dot{z}, V, A)dV = \int (A + V - \dot{z})dV \tag{211}$$

$$\int \mathrm{f}'\,(\dot{z}, V, A)dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{212}$$

$$\int (A + V - \dot{z})dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{213}$$

1.1.38 Derivation 37

$$\mathrm{A_x}\,(\mathbf{S}) = e^{\mathbf{S}} \tag{214}$$

$$\mathrm{A_x}\,(\mathbf{S}) + e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{215}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}\,(\mathbf{S}) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}2e^{\mathbf{S}} \tag{216}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\,\mathrm{A_x}\,(\mathbf{S}) = 2e^{\mathbf{S}} \tag{217}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}\,(\mathbf{S}) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\,\mathrm{A_x}\,(\mathbf{S})) \tag{218}$$

1.1.39 Derivation 38

$$J(\phi_1) = \sin{(\phi_1)} \tag{219}$$

$$\frac{d}{d\phi_1}J(\phi_1) = \frac{d}{d\phi_1}\sin{(\phi_1)} \tag{220}$$

$$\sin{(\phi_1)}\frac{d}{d\phi_1}J(\phi_1) = \sin{(\phi_1)}\frac{d}{d\phi_1}\sin{(\phi_1)} \tag{221}$$

$$\sin{(\phi_1)}\frac{d}{d\phi_1}J(\phi_1) = \sin{(\phi_1)}\cos{(\phi_1)} \tag{222}$$

$$\sin{(\phi_1)}\frac{d}{d\phi_1}\sin{(\phi_1)} = \sin{(\phi_1)}\cos{(\phi_1)} \tag{223}$$

$$J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = J(\phi_1)\cos{(\phi_1)} \tag{224}$$

1.1.40 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{225}$$

$$\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \tag{226}$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A}+\varepsilon_0) d\mathbf{A})^{\varepsilon_0} \tag{227}$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{228}$$

$$(\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{229}$$

1.1.41 Derivation 40

$$\hat{p}(k, \hat{H}_\lambda) = \frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} \tag{230}$$

$$\hat{p}(k, \hat{H}_\lambda) - \frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = 0 \tag{231}$$

$$\hat{p}(k, \hat{H}_\lambda) = \frac{1}{k} \tag{232}$$

$$-\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} + \frac{1}{k} = 0 \tag{233}$$

1.1.42 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^\pi} \tag{234}$$

$$\int \mathrm{F_x}(\pi) d\pi = \int e^{e^\pi} d\pi \tag{235}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^\pi) \tag{236}$$

$$0 = -\int \mathrm{F_x}(\pi) d\pi + \int e^{e^\pi} d\pi \tag{237}$$

$$0 = F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi) d\pi \tag{238}$$

$$0 = F_g - P_g \tag{239}$$

1.1.43 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c \cos(\lambda) \tag{240}$$

$$\frac{\partial}{\partial c} \dot{\mathbf{r}}(\lambda, c) = \frac{\partial}{\partial c} c \cos(\lambda) \tag{241}$$

$$(\frac{\partial}{\partial c} \dot{\mathbf{r}}(\lambda, c))^\lambda = (\frac{\partial}{\partial c} c \cos(\lambda))^\lambda \tag{242}$$

$$(\frac{\partial}{\partial c} \dot{\mathbf{r}}(\lambda, c))^\lambda = \cos^\lambda(\lambda) \tag{243}$$

$$\cos^\lambda(\lambda) = (\frac{\partial}{\partial c} c \cos(\lambda))^\lambda \tag{244}$$

1.1.44 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{245}$$

$$G(\nabla) + \int \cos(\nabla) d\nabla = \cos(\nabla) + \int \cos(\nabla) d\nabla \tag{246}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{247}$$

$$\int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla = \int (\varphi + \sin(\nabla) + \cos(\nabla)) d\nabla \tag{248}$$

$$-G(\nabla) + \int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla - \int \cos(\nabla) d\nabla = -G(\nabla) + \tag{249}$$

1.1.45 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*} (\pi + f^*) \tag{250}$$

$$f^* \nabla(f^*, \pi) = f^* \frac{\partial}{\partial f^*} (\pi + f^*) \tag{251}$$

$$f^* \nabla(f^*, \pi) = f^* \tag{252}$$

$$(f^* \nabla(f^*, \pi))^{f^*} = (f^*)^{f^*} \tag{253}$$

$$f^* \nabla(f^*, \pi) + (f^* \nabla(f^*, \pi))^{f^*} = f^* \nabla(f^*, \pi) + (f^*)^{f^*} \tag{254}$$

$$f^* \frac{\partial}{\partial f^*} (\pi + f^*) + (f^* \frac{\partial}{\partial f^*} (\pi + f^*))^{f^*} = f^* \frac{\partial}{\partial f^*} (\pi + f^*) + (f^*)^{f^*} \tag{255}$$

1.1.46 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{256}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{257}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = -\frac{F_x}{\mathbf{r}^2} \tag{258}$$

$$\frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}^2} \tag{259}$$

$$-F_x + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -F_x - \frac{F_x}{\mathbf{r}^2} \tag{260}$$

1.1.47 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{261}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{262}$$

$$\int u(\lambda)d\lambda = n - \cos(\lambda) \tag{263}$$

$$\int \sin(\lambda)d\lambda = n - \cos(\lambda) \tag{264}$$

$$-\frac{\int \sin(\lambda)d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{265}$$

1.1.48 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{266}$$

$$\phi_1 \mathrm{f}'(\phi_1) = \phi_1^2 \tag{267}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \int \phi_1^2 d\phi_1 \tag{268}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{269}$$

$$\int \phi_1^2 d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{270}$$

$$\frac{\phi_1^3}{3} + n_2 = \hbar + \frac{\phi_1^3}{3} \tag{271}$$

1.1.49 Derivation 48

$$\mathrm{a}^\dagger(\omega) = \int \log(\omega)d\omega \tag{272}$$

$$\mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega + \rho \tag{273}$$

$$-\rho + \mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega \tag{274}$$

$$(-\rho + \mathrm{a}^\dagger(\omega))^\omega = (\omega\log(\omega) - \omega)^\omega \tag{275}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^\dagger(\omega))^\omega = \frac{d}{d\rho}(\omega\log(\omega) - \omega)^\omega \tag{276}$$

1.1.50 Derivation 49

$$\hat{x}(f) = \int \log(f)df \tag{277}$$

$$\hat{x}(f) = B + f\log(f) - f \tag{278}$$

$$B + f\log(f) - f = \int \log(f)df \tag{279}$$

$$B + f\log(f) = f + \int \log(f)df \tag{280}$$

1.1.51 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{281}$$

$$\int \mathbf{v}(C_2)dC_2 = \int C_2 dC_2 \tag{282}$$

$$\int \mathbf{v}(C_2)dC_2 = \frac{C_2^2}{2} + v \tag{283}$$

$$\int \mathbf{v}(C_2)d\mathbf{v}(C_2) = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{284}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{285}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{286}$$

1.1.52 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{287}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log(\mathbf{s}) d\mathbf{s} \tag{288}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s}\log(\mathbf{s}) - \mathbf{s} + \omega \tag{289}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{290}$$

$$a(\mathbf{s}) = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{291}$$

1.1.53 Derivation 52

$$\mathrm{v_t}(t, \hat{X}) = \hat{X}^t \tag{292}$$

$$\frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \frac{\partial}{\partial t} \hat{X}^t \tag{293}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \frac{\partial}{\partial t} \hat{X}^t \tag{294}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \hat{X}^t \log(\hat{X}) \tag{295}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \mathrm{v_t}(t, \hat{X}) \log(\hat{X}) \tag{296}$$

$$\hat{X} + \frac{\partial}{\partial t} \hat{X}^t = \hat{X} + \hat{X}^t \log(\hat{X}) \tag{297}$$

1.1.54 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{298}$$

$$\frac{d}{dA} \mathrm{A_y}(A) = \frac{d}{dA} e^A \tag{299}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = (\frac{d}{dA} e^A)^A \tag{300}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = (e^A)^A \tag{301}$$

$$(\frac{d}{dA} e^A)^A = (e^A)^A \tag{302}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = \mathrm{A_y}^A(A) \tag{303}$$

1.1.55 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{304}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{305}$$

$$\frac{\partial}{\partial \mathbf{P}} \frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}^2} \tag{306}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{307}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{308}$$

1.1.56 Derivation 55

$$x(C_d) = \log(C_d) \tag{309}$$

$$x^{C_d}(C_d) = \log(C_d)^{C_d} \tag{310}$$

$$\frac{d}{dC_d} x^{C_d}(C_d) = \frac{d}{dC_d} \log(C_d)^{C_d} \tag{311}$$

$$(\frac{C_d \frac{d}{dC_d} x(C_d)}{x(C_d)} + \log(x(C_d))) x^{C_d}(C_d) = (\log(\log(C_d)) + \frac{1}{\log(C_d} \tag{312}$$

$$(\frac{C_d \frac{d}{dC_d} x(C_d)}{x(C_d)} + \log(x(C_d))) \log(C_d)^{C_d} = (\log(\log(C_d)) + \frac{1}{\log(} \tag{313}$$

1.1.57 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{314}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \frac{d}{d\psi^*} \sin(\psi^*) \tag{315}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \cos(\psi^*) \tag{316}$$

$$C(\psi^*) + \frac{d}{d\psi^*} \sin(\psi^*) = \sin(\psi^*) + \frac{d}{d\psi^*} \sin(\psi^*) \tag{317}$$

$$C(\psi^*) + \frac{d}{d\psi^*} C(\psi^*) = \sin(\psi^*) + \frac{d}{d\psi^*} C(\psi^*) \tag{318}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{319}$$

1.1.58 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{320}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{321}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{322}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{323}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{324}$$

1.1.59 Derivation 58

$$\mathrm{E_x}\left(t_2\right) = \frac{1}{t_2} \tag{325}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = \int \frac{1}{t_2} dt_2 \tag{326}$$

$$(\int \mathrm{E_x}\left(t_2\right) dt_2)^{t_2} = (\int \frac{1}{t_2} dt_2)^{t_2} \tag{327}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(t_2\right) \tag{328}$$

$$(C_1 + \log\left(t_2\right))^{t_2} = (\int \frac{1}{t_2} dt_2)^{t_2} \tag{329}$$

$$(C_1 + \log\left(t_2\right))^{t_2} = (\int \mathrm{E_x}\left(t_2\right) dt_2)^{t_2} \tag{330}$$

1.1.60 Derivation 59

$$\mathrm{M_E}\left(\psi^*\right) = \log\left(\psi^*\right) \tag{331}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{d}{d\psi^*}\log\left(\psi^*\right) \tag{332}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{1}{\psi^*} \tag{333}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\log\left(\psi^*\right) \tag{334}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*}\log\left(\psi^*\right))^{\psi^*} \tag{335}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\log\left(\psi^*\right))^{\psi^*})^{\psi^*} \tag{336}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*}\log\left(\psi^*\right))^{\psi^*})^{\psi^*})^{\psi^*} \tag{337}$$

1.1.61 Derivation 60

$$H(u) = e^u \tag{338}$$

$$1 = \frac{e^u}{H(u)} \tag{339}$$

$$\int 1 du = \int \frac{e^u}{H(u)} du \tag{340}$$

$$A_x + u = \int \frac{e^u}{H(u)} du \tag{341}$$

$$-A_x - u = -\int \frac{e^u}{H(u)} du \tag{342}$$

1.1.62 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{343}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{344}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = 0 \tag{345}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{346}$$

1.1.63 Derivation 62

$$\tilde{g}(\dot{y}, J_\varepsilon) = -J_\varepsilon + \dot{y} \tag{347}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{348}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = -1 \tag{349}$$

$$-1 = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{350}$$

$$\int (-1) dJ_\varepsilon = \int \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) dJ_\varepsilon \tag{351}$$

1.1.64 Derivation 63

$$\mathrm{A_x}\left(W, \chi\right) = \log\left(\chi^W\right) \tag{352}$$

$$\int \mathrm{A_x}\left(W, \chi\right) dW = \int \log\left(\chi^W\right) dW \tag{353}$$

$$\int \mathrm{A_x}\left(W, \chi\right) dW = M + \frac{W^2 \log\left(\chi\right)}{2} \tag{354}$$

$$\int \log{(\chi^{W})}dW = M + \frac{W^{2} \log{(\chi)}}{2} \tag{355}$$

$$- (e^{\chi})^{\chi} + \int \log{(\chi^{W})}dW = M + \frac{W^{2} \log{(\chi)}}{2} - (e^{\chi})^{\chi} \tag{356}$$

1.1.65 Derivation 64

$$\delta(q) = \log{(q)} \tag{357}$$

$$\int \delta(q)dq = \int \log{(q)}dq \tag{358}$$

$$0 = - \int \delta(q)dq + \int \log{(q)}dq \tag{359}$$

$$0 = A_{2} + q \log{(q)} - q - \int \delta(q)dq \tag{360}$$

$$0 = A_{2} + q\delta(q) - q - \int \delta(q)dq \tag{361}$$

$$0 = A_{2} + q\delta(q) - q - \int \log{(q)}dq \tag{362}$$

$$0 = A_{2} - m_{s} + q\delta(q) - q \log{(q)} \tag{363}$$

$$\frac{d}{dA_{2}} 0 = \frac{\partial}{\partial A_{2}} (A_{2} - m_{s} + q\delta(q) - q \log{(q)}) \tag{364}$$

1.1.66 Derivation 65

$$\operatorname{A_{y}}{(\phi_{2})} = \cos{(\phi_{2})} \tag{365}$$

$$\frac{d}{d\phi_{2}} \operatorname{A_{y}}{(\phi_{2})} = \frac{d}{d\phi_{2}} \cos{(\phi_{2})} \tag{366}$$

$$\frac{d}{d\phi_{2}} \operatorname{A_{y}}{(\phi_{2})} = - \sin{(\phi_{2})} \tag{367}$$

$$\frac{d}{d\phi_{2}} \cos{(\phi_{2})} = - \sin{(\phi_{2})} \tag{368}$$

$$\frac{d^{2}}{d\phi_{2}^{2}} \cos{(\phi_{2})} = \frac{d}{d\phi_{2}} - \sin{(\phi_{2})} \tag{369}$$

$$\frac{d^{3}}{d\phi_{2}^{3}} \cos{(\phi_{2})} = \frac{d^{2}}{d\phi_{2}^{2}} - \sin{(\phi_{2})} \tag{370}$$

1.1.67 Derivation 66

$$\mathbf{g}(Q) = \sin{(e^{Q})} \tag{371}$$

$$\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ} \sin{(e^{Q})} \tag{372}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ}\mathbf{g}(Q) + \frac{d}{dQ} \sin{(e^{Q})} \tag{373}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = e^{Q} \cos{(e^{Q})} + \frac{d}{dQ}\mathbf{g}(Q) \tag{374}$$

$$\int 2\frac{d}{dQ}\mathbf{g}(Q)dQ = \int (e^{Q} \cos{(e^{Q})} + \frac{d}{dQ}\mathbf{g}(Q))dQ \tag{375}$$

1.1.68 Derivation 67

$$l(\varphi^{*}) = \frac{d}{d\varphi^{*}} e^{\varphi^{*}} \tag{376}$$

$$l(\varphi^{*}) - 1 = \frac{d}{d\varphi^{*}} e^{\varphi^{*}} - 1 \tag{377}$$

$$l(\varphi^{*}) = e^{\varphi^{*}} \tag{378}$$

$$e^{\varphi^{*}} = \frac{d}{d\varphi^{*}} e^{\varphi^{*}} \tag{379}$$

$$l(\varphi^{*}) - 1 = \frac{d^{2}}{d(\varphi^{*})^{2}} e^{\varphi^{*}} - 1 \tag{380}$$

1.1.69 Derivation 68

$$l(M_{E}) = \cos{(M_{E})} \tag{381}$$

$$\frac{d}{dM_{E}}l(M_{E}) = \frac{d}{dM_{E}} \cos{(M_{E})} \tag{382}$$

$$\frac{d}{dM_{E}}l(M_{E}) - \frac{d}{dM_{E}} \cos{(M_{E})} = 0 \tag{383}$$

$$\sin{(M_{E})} + \frac{d}{dM_{E}}l(M_{E}) = 0 \tag{384}$$

$$\sin{(M_{E})} + \frac{d}{dM_{E}} \cos{(M_{E})} = 0 \tag{385}$$

$$\int (\sin{(M_{E})} + \frac{d}{dM_{E}} \cos{(M_{E})})dM_{E} = \int 0dM_{E} \tag{386}$$

$$\int (\sin{(M_E)} + \frac{d}{dM_E}\cos{(M_E)})dM_E - 1 = \int 0 dM_E - 1 \tag{387}$$

$$y' - 1 = \int 0 dM_E - 1 \tag{388}$$

$$y' - 1 = \int (\sin{(M_E)} + \frac{d}{dM_E}\cos{(M_E)})dM_E - 1 \tag{389}$$

1.1.70 Derivation 69

$$\hat{\mathbf{x}}(C_2) = \sin{(C_2)} \tag{390}$$

$$\frac{d}{dC_2}\hat{\mathbf{x}}(C_2) = \frac{d}{dC_2}\sin{(C_2)} \tag{391}$$

$$\int \frac{d}{dC_2}\hat{\mathbf{x}}(C_2)dC_2 = \int \frac{d}{dC_2}\sin{(C_2)}dC_2 \tag{392}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \sin{(C_2)} \tag{393}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \hat{\mathbf{x}}(C_2) \tag{394}$$

$$c + \sin{(C_2)} = \varepsilon + \sin{(C_2)} \tag{395}$$

$$\varepsilon + c + 2\sin{(C_2)} = 2\varepsilon + 2\sin{(C_2)} \tag{396}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin{(C_2)}) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin{(C_2)}) \tag{397}$$

1.1.71 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos{(U)} \tag{398}$$

$$\hat{\mathbf{r}}^2(U) = \hat{\mathbf{r}}(U)\cos{(U)} \tag{399}$$

$$1 = \frac{\cos{(U)}}{\hat{\mathbf{r}}(U)} \tag{400}$$

$$\hat{\mathbf{r}}(U)\cos{(U)} = \cos^2{(U)} \tag{401}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2{(U)} \tag{402}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \int \cos^2{(U)}dU \tag{403}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \frac{U}{2} + y + \frac{\sin{(U)}\cos{(U)}}{2} \tag{404}$$

$$\frac{U}{2} + y + \frac{\sin{(U)}\cos{(U)}}{2} = \int \cos^2{(U)}dU \tag{405}$$

1.1.72 Derivation 71

$$\mathrm{v_x}\left(G, L\right) = G - L \tag{406}$$

$$L + \mathrm{v_x}\left(G, L\right) = G \tag{407}$$

$$\frac{\partial}{\partial G}(L + \mathrm{v_x}\left(G, L\right)) = \frac{d}{dG}G \tag{408}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) = 1 \tag{409}$$

$$(\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G = 1 \tag{410}$$

$$((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G = 1 \tag{411}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G)^G = 1 \tag{412}$$

1.1.73 Derivation 72

$$\mathrm{A_1}\left(\theta_1\right) = \cos{(\theta_1)} \tag{413}$$

$$\mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)} = \cos^2{(\theta_1)} \tag{414}$$

$$\int \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)}d\theta_1 = \int \cos^2{(\theta_1)}d\theta_1 \tag{415}$$

$$\int \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} \tag{416}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} = \int \cos^2{(\theta_1)}d\theta_1 \tag{417}$$

1.1.74 Derivation 73

$$\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \mathbf{J}_M \tag{418}$$

$$-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \mathbf{J}_M - J_\varepsilon \tag{419}$$

$$\frac{\partial}{\partial \mathbf{J}_M}(-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M)) = \frac{\partial}{\partial \mathbf{J}_M}(J_\varepsilon \mathbf{J}_M - J_\varepsilon) \tag{420}$$

$$\frac{\partial}{\partial \mathbf{J}_M}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \tag{421}$$

$$\frac{\partial^2}{\partial \mathbf{J}_M^2}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = \frac{d}{d\mathbf{J}_M}J_\varepsilon \tag{422}$$

1.1.75 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{423}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{424}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{425}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} \tag{426}$$

1.1.76 Derivation 75

$$\mathrm{A_z}\,(F_N) = \sin{(F_N)} \tag{427}$$

$$\int \mathrm{A_z}\,(F_N) dF_N = \int \sin{(F_N)} dF_N \tag{428}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}\,(F_N) dF_N)^2 \tag{429}$$

$$\mathbf{v}(F_N) = (\int \sin{(F_N)} dF_N)^2 \tag{430}$$

$$\mathbf{v}(F_N) = (Q - \cos{(F_N)})^2 \tag{431}$$

$$(\int \mathrm{A_z}\,(F_N) dF_N)^2 = (\int \sin{(F_N)} dF_N)^2 \tag{432}$$

$$(\int \mathrm{A_z}\,(F_N) dF_N)^2 = (Q - \cos{(F_N)})^2 \tag{433}$$

$$(\int \sin{(F_N)} dF_N)^2 = (Q - \cos{(F_N)})^2 \tag{434}$$

1.1.77 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{435}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin{(\hat{X})} \tag{436}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos{(\hat{X})} \tag{437}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = \frac{d}{d\hat{X}}\cos{(\hat{X})} \tag{438}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{439}$$

1.1.78 Derivation 77

$$A(\dot{z}) = e^{\sin{(\dot{z})}} \tag{440}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = \frac{d}{d\dot{z}}e^{\sin{(\dot{z})}} \tag{441}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{442}$$

$$-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z}) = -A(\dot{z}) + e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{443}$$

$$e^{-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z})} = e^{-A(\dot{z}) + e^{\sin{(\dot{z})}}\cos{(\dot{z})}} \tag{444}$$

$$(e^{-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z})})^{\dot{z}} = (e^{-A(\dot{z}) + e^{\sin{(\dot{z})}}\cos{(\dot{z})}})^{\dot{z}} \tag{445}$$

1.1.79 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{446}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \int \cos{(L_\varepsilon)} dL_\varepsilon \tag{447}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \int \cos{(L_\varepsilon)} dL_\varepsilon + 1 \tag{448}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{449}$$

$$\int \cos{(L_\varepsilon)} dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{450}$$

$$(\int \cos{(L_\varepsilon)} dL_\varepsilon + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{451}$$

$$(r_0 + \sin{(L_\varepsilon)} + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{452}$$

1.1.80 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{453}$$

$$0 = -\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0) \tag{454}$$

$$\frac{d}{d\varepsilon_0} 0 = \frac{d}{d\varepsilon_0}(-\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0)) \tag{455}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{456}$$

$$\int 0 d\varepsilon_0 = \int (\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0)) d\varepsilon_0 \tag{457}$$

1.1.81 Derivation 80

$$S(Q, \mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{458}$$

$$\frac{\partial}{\partial Q} S(Q, \mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{459}$$

$$\frac{\partial}{\partial Q} S(Q, \mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{460}$$

$$\int \frac{\partial}{\partial Q} S(Q, \mathbf{M}) d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2} d\mathbf{M} \tag{461}$$

$$0 = \int -\frac{\mathbf{M}}{Q^2} d\mathbf{M} - \int \frac{\partial}{\partial Q} S(Q, \mathbf{M}) d\mathbf{M} \tag{462}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2} d\mathbf{M} \tag{463}$$

$$0 = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} d\mathbf{M} - \int \frac{\partial}{\partial Q} S(Q, \mathbf{M}) d\mathbf{M} \tag{464}$$

1.1.82 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l) d\hat{H}_l \tag{465}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{466}$$

$$V - \cos(\hat{H}_l) = \int \sin(\hat{H}_l) d\hat{H}_l \tag{467}$$

$$-\mathbf{F}(\hat{H}_l) = -\int \sin(\hat{H}_l) d\hat{H}_l \tag{468}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{469}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{470}$$

$$-V + \cos(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{471}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-C + \cos(\hat{H}_l))^C \tag{472}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos(\hat{H}_l))^C \tag{473}$$

1.1.83 Derivation 82

$$\mathrm{f}'(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{474}$$

$$\mathrm{f}'(\mathbf{J}_f) = \cos(\mathbf{J}_f) \tag{475}$$

$$\mathrm{f}'(\mathbf{J}_f)\sin(\mathbf{J}_f) = \sin(\mathbf{J}_f)\frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{476}$$

$$\cos(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{477}$$

$$\mathrm{f}'(\mathbf{J}_f)\sin(\mathbf{J}_f) = \sin(\mathbf{J}_f)\cos(\mathbf{J}_f) \tag{478}$$

1.1.84 Derivation 83

$$y(W, q, B) = W + \frac{q}{B} \tag{479}$$

$$0 = W - y(W, q, B) + \frac{q}{B} \tag{480}$$

$$\frac{d}{dq} 0 = \frac{\partial}{\partial q}(W - y(W, q, B) + \frac{q}{B}) \tag{481}$$

$$0 = -\frac{\partial}{\partial q} y(W, q, B) + \frac{1}{B} \tag{482}$$

$$0 = -\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} \tag{483}$$

1.1.85 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{484}$$

$$\mathbf{S}(Z)e^Z = e^Z \int e^Z dZ \tag{485}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{486}$$

$$(\hat{H}_\lambda + e^Z)e^Z = e^Z \int e^Z dZ \tag{487}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{488}$$

$$(\phi + e^Z)e^Z = e^Z \int e^Z dZ \tag{489}$$

$$((\phi + e^Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{490}$$

$$e^{((\phi+e^Z)e^Z)^\phi} = e^{(e^Z \int e^Z dZ)^\phi} \tag{491}$$

1.1.86 Derivation 85

$$\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{492}$$

$$\varepsilon + \mathrm{A_x}(\varepsilon) = \varepsilon + e^\varepsilon \tag{493}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \frac{d}{d\varepsilon}e^\varepsilon \tag{494}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{495}$$

$$\varepsilon + \mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{496}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{497}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) \tag{498}$$

1.1.87 Derivation 86

$$C(\phi_2) = \log(\phi_2) \tag{499}$$

$$2C(\phi_2) = C(\phi_2) + \log(\phi_2) \tag{500}$$

$$\frac{d}{d\phi_2}2C(\phi_2) = \frac{d}{d\phi_2}(C(\phi_2) + \log(\phi_2)) \tag{501}$$

$$2\frac{d}{d\phi_2}C(\phi_2) = \frac{d}{d\phi_2}C(\phi_2) + \frac{1}{\phi_2} \tag{502}$$

$$2\frac{d}{d\phi_2}\log(\phi_2) = \frac{d}{d\phi_2}\log(\phi_2) + \frac{1}{\phi_2} \tag{503}$$

$$4(\frac{d}{d\phi_2}\log(\phi_2))^2 = (\frac{d}{d\phi_2}\log(\phi_2) + \frac{1}{\phi_2})^2 \tag{504}$$

1.1.88 Derivation 87

$$\mathrm{r}_0(\eta, g) = \int (\eta + g) dg \tag{505}$$

$$\mathrm{r}_0(\eta, g) = \eta g + \sigma_p + \frac{g^2}{2} \tag{506}$$

$$\int (\eta + g) dg = \eta g + \sigma_p + \frac{g^2}{2} \tag{507}$$

$$\mathrm{r}_0(\eta, g) + \int (\eta + g) dg = \eta g + \sigma_p + \frac{g^2}{2} + \mathrm{r}_0(\eta, g) \tag{508}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg = 2\eta g + 2\sigma_p + g^2 \tag{509}$$

1.1.89 Derivation 88

$$\mathrm{L}_\varepsilon(a) = \sin(a) \tag{510}$$

$$V(a) = \frac{d}{da}\mathrm{L}_\varepsilon(a) \tag{511}$$

$$V^a(a) = (\frac{d}{da}\mathrm{L}_\varepsilon(a))^a \tag{512}$$

$$V^a(a) = (\frac{d}{da}\sin(a))^a \tag{513}$$

$$(V^a(a))^a = ((\frac{d}{da}\sin(a))^a)^a \tag{514}$$

$$(V^a(a))^a = (\cos^a(a))^a \tag{515}$$

$$(V^a(a))^a + (\frac{d}{da}\mathrm{L}_\varepsilon(a))^a = (\cos^a(a))^a + (\frac{d}{da}\mathrm{L}_\varepsilon(a))^a \tag{516}$$

1.1.90 Derivation 89

$$\mathrm{g}'_{\varepsilon}(\phi) = \sin(\phi) \tag{517}$$

$$\frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) = \frac{d}{d\phi}\sin(\phi) \tag{518}$$

$$\frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) - \frac{d}{d\phi}\sin(\phi) = 0 \tag{519}$$

$$-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) = 0 \tag{520}$$

$$(-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi))^{\phi} = 0^{\phi} \tag{521}$$

$$\frac{(-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi))^{\phi}}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} = \frac{0^{\phi}}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} \tag{522}$$

1.1.91 Derivation 90

$$\omega(\mu) = e^{\mu} \tag{523}$$

$$1 = \frac{e^{\mu}}{\omega(\mu)} \tag{524}$$

$$\int 1 d\mu = \int \frac{e^{\mu}}{\omega(\mu)} d\mu \tag{525}$$

$$\mathbf{J} + \mu = \int \frac{e^{\mu}}{\omega(\mu)} d\mu \tag{526}$$

$$\mathbf{J} + \mu - \frac{1}{\omega(\mu)} = \int \frac{e^{\mu}}{\omega(\mu)} d\mu - \frac{1}{\omega(\mu)} \tag{527}$$

$$\mathbf{J} + \mu + \frac{e^{\mu}}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \int \frac{e^{\mu}}{\omega(\mu)} d\mu + \frac{e^{\mu}}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{528}$$

1.1.92 Derivation 91

$$\mathrm{v_t}(q) = \int \cos(q) dq \tag{529}$$

$$\mathrm{v_t}(q) = E + \sin(q) \tag{530}$$

$$\frac{\mathrm{v_t}(q)}{E} = \frac{\int \cos(q) dq}{E} \tag{531}$$

$$\frac{E + \sin(q)}{E} = \frac{\int \cos(q) dq}{E} \tag{532}$$

$$\mathrm{y}'(q, E) = -E - \sin(q) + \frac{E + \sin(q)}{E} \tag{533}$$

$$\mathrm{y}'(q, E) = -E - \sin(q) + \frac{\int \cos(q) dq}{E} \tag{534}$$

1.1.93 Derivation 92

$$\mathbf{J}(q) = \log(q) \tag{535}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq}\log(q) \tag{536}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{1}{q} \tag{537}$$

$$\mathbf{v}\frac{d}{dq}\mathbf{J}(q) = \frac{\mathbf{v}}{q} \tag{538}$$

$$\mathbf{v}\frac{d}{dq}\log(q) = \frac{\mathbf{v}}{q} \tag{539}$$

$$\int \mathbf{v}\frac{d}{dq}\log(q) dq = \int \frac{\mathbf{v}}{q} dq \tag{540}$$

$$\iint \mathbf{v}\frac{d}{dq}\log(q) dq dq = \iint \frac{\mathbf{v}}{q} dq dq \tag{541}$$

$$\frac{\iint \mathbf{v}\frac{d}{dq}\log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{542}$$

1.1.94 Derivation 93

$$\mathbf{M}(C_2, \hat{p}) = \int (-C_2 + \hat{p}) dC_2 \tag{543}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (\int (-C_2 + \hat{p}) dC_2)^{C_2} \tag{544}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} \tag{545}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (\int (-C_2 + \hat{p}) dC_2)^{C_2} \tag{546}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{547}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{548}$$

1.1.95 Derivation 94

$$\mathbf{p}(E_x) = \sin\left(e^{E_x}\right) \tag{549}$$

$$\dot{y}(U) = \sin\left(U\right) \tag{550}$$

$$\frac{d}{dU}\dot{y}(U) = \frac{d}{dU}\sin\left(U\right) \tag{551}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) = \frac{d}{dE_x}\sin\left(e^{E_x}\right) \tag{552}$$

$$\frac{d}{dU}\dot{y}(U) = \cos\left(U\right) \tag{553}$$

$$\frac{d}{dU}\sin\left(U\right) = \cos\left(U\right) \tag{554}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) + \frac{d}{dU}\sin\left(U\right) = \frac{d}{dU}\sin\left(U\right) + \frac{d}{dE_x}\sin\left(e^{E_x}\right) \tag{555}$$

$$\cos\left(U\right) + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos\left(U\right) + \frac{d}{dE_x}\sin\left(e^{E_x}\right) \tag{556}$$

1.1.96 Derivation 95

$$\mathrm{v_y}\left(L\right) = e^{L} \tag{557}$$

$$\frac{d}{dL}\mathrm{v_y}\left(L\right) = \frac{d}{dL}e^{L} \tag{558}$$

$$2\,\mathrm{v_y}\left(L\right) = \mathrm{v_y}\left(L\right) + e^{L} \tag{559}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}\left(L\right) = \frac{d^2}{dL^2}e^{L} \tag{560}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}\left(L\right) = e^{L} \tag{561}$$

$$2\,\mathrm{v_y}\left(L\right) = \mathrm{v_y}\left(L\right) + \frac{d^2}{dL^2}\mathrm{v_y}\left(L\right) \tag{562}$$

1.1.97 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{563}$$

$$\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} = 1 \tag{564}$$

$$\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} + 1 = 2 \tag{565}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{566}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{567}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \frac{1}{\mathbf{s}^2} \tag{568}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} - 1} \tag{569}$$

1.1.98 Derivation 97

$$\mathbf{J}_f(F_g) = e^{e^{F_g}} \tag{570}$$

$$\int \mathbf{J}_f(F_g)dF_g = \int e^{e^{F_g}}dF_g \tag{571}$$

$$\int \mathbf{J}_f(F_g)dF_g = h + \mathrm{Ei}\left(e^{F_g}\right) \tag{572}$$

$$2\int \mathbf{J}_f(F_g)dF_g = h + \mathrm{Ei}\left(e^{F_g}\right) + \int \mathbf{J}_f(F_g)dF_g \tag{573}$$

$$h + \mathrm{Ei}\left(e^{F_g}\right) = \int e^{e^{F_g}}dF_g \tag{574}$$

$$2\int \mathbf{J}_f(F_g)dF_g = \int \mathbf{J}_f(F_g)dF_g + \int e^{e^{F_g}}dF_g \tag{575}$$

$$2\int \mathbf{J}_f(F_g)dF_g = z^{*} + \mathrm{Ei}\left(e^{F_g}\right) + \int \mathbf{J}_f(F_g)dF_g \tag{576}$$

1.1.99 Derivation 98

$$\Psi(\delta) = \log{(\delta)} \tag{577}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log{(\delta)} \tag{578}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{579}$$

$$\frac{d}{d\delta}\log{(\delta)} = \frac{1}{\delta} \tag{580}$$

$$(\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log{(\delta)} = \frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} \tag{581}$$

1.1.100 Derivation 99

$$\mathbf{S}(G,\Omega) = G + \Omega \tag{582}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega) = \frac{\partial}{\partial\Omega}(G+\Omega) \tag{583}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega) = 1 \tag{584}$$

$$(G+\Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega) = G+\Omega \tag{585}$$

$$\mathrm{f}_{\mathbf{p}}\left(G,\Omega\right) = (G+\Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega) \tag{586}$$

$$\mathrm{f}_{\mathbf{p}}\left(G,\Omega\right) = (G+\Omega)\frac{\partial}{\partial\Omega}(G+\Omega) \tag{587}$$

$$\mathrm{f}_{\mathbf{p}}\left(G,\Omega\right) = (G+\Omega)\frac{\partial}{\partial\Omega}(G+\Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega) \tag{588}$$

1.2 Perturbation: VR

1.2.1 Derivation 0

$$\beta(\iota) = e^{\iota} \tag{589}$$

$$\frac{d}{d\iota}\beta(\iota) = \frac{d}{d\iota}e^{\iota} \tag{590}$$

$$\frac{d}{d\iota}\beta(\iota) = e^{\iota} \tag{591}$$

$$\frac{d}{d\iota}\beta(\iota) = \beta(\iota) \tag{592}$$

$$\beta(\iota)\frac{d}{d\iota}\beta(\iota) = \beta^{2}(\iota) \tag{593}$$

$$\frac{d}{d\iota}\beta(\iota) = \frac{d^{2}}{d\iota^{2}}\beta(\iota) \tag{594}$$

$$\beta(\iota)\frac{d^{2}}{d\iota^{2}}\beta(\iota) = \beta^{2}(\iota) \tag{595}$$

1.2.2 Derivation 1

$$\beta(\gamma) = \frac{d}{d\gamma}\sin{(\gamma)} \tag{596}$$

$$\frac{d}{d\gamma}\beta(\gamma) = \frac{d^{2}}{d\gamma^{2}}\sin{(\gamma)} \tag{597}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin{(\gamma)} \tag{598}$$

$$\frac{d^{2}}{d\gamma^{2}}\sin{(\gamma)} = -\sin{(\gamma)} \tag{599}$$

1.2.3 Derivation 2

$$\nu(\tau) = e^{\tau} \tag{600}$$

$$\int\nu(\tau)d\tau = \int e^{\tau}d\tau \tag{601}$$

$$\tau + \int\nu(\tau)d\tau = \tau + \int e^{\tau}d\tau \tag{602}$$

$$\tau + \int\nu(\tau)d\tau = \gamma + \tau + e^{\tau} \tag{603}$$

$$\tau + \int\nu(\tau)d\tau = \gamma + \tau + \nu(\tau) \tag{604}$$

1.2.4 Derivation 3

$$\gamma(\iota,\beta) = \int(-\beta+\iota)d\beta \tag{605}$$

$$\beta\gamma(\iota,\beta) = \beta\int(-\beta+\iota)d\beta \tag{606}$$

$$\beta\gamma(\iota,\beta) = \beta(-\frac{\beta^{2}}{2} + \beta\iota + \nu) \tag{607}$$

$$\beta\int(-\beta+\iota)d\beta = \beta(-\frac{\beta^{2}}{2} + \beta\iota + \nu) \tag{608}$$

1.2.5 Derivation 4

$$\beta(o) = \sin{(o)} \tag{609}$$

$$\frac{d}{do}\beta(o) = \frac{d}{do}\sin{(o)} \tag{610}$$

$$\frac{d}{do}\beta(o) = \cos{(o)} \tag{611}$$

$$\frac{d}{do}\sin{(o)} = \cos{(o)} \tag{612}$$

$$\frac{\frac{d}{do}\sin{(o)}}{o} = \frac{\cos{(o)}}{o} \tag{613}$$

$$-1 + \frac{\frac{d}{do}\sin{(o)}}{o} = -1 + \frac{\cos{(o)}}{o} \tag{614}$$

1.2.6 Derivation 5

$$\alpha(\kappa,\gamma) = \int(\gamma+\kappa)d\gamma \tag{615}$$

$$\alpha(\kappa,\gamma) = \frac{\gamma^2}{2} + \gamma\kappa + \zeta \tag{616}$$

$$\frac{\alpha(\kappa,\gamma)}{\frac{\gamma^2}{2} + \gamma\kappa + \zeta} = 1 \tag{617}$$

$$\frac{\int(\gamma+\kappa)d\gamma}{\frac{\gamma^2}{2} + \gamma\kappa + \zeta} = 1 \tag{618}$$

1.2.7 Derivation 6

$$o(\upsilon) = \cos(\upsilon) \tag{619}$$

$$\int o(\upsilon)d\upsilon = \int \cos(\upsilon)d\upsilon \tag{620}$$

$$\int o(\upsilon)d\upsilon = \tau + \sin(\upsilon) \tag{621}$$

$$\tau + \sin(\upsilon) = \int \cos(\upsilon)d\upsilon \tag{622}$$

$$(\tau + \sin(\upsilon))^\tau = (\int \cos(\upsilon)d\upsilon)^\tau \tag{623}$$

$$2(\tau+\sin(\upsilon))^\tau = (\tau+\sin(\upsilon))^\tau + (\int \cos(\upsilon)d\upsilon)^\tau \tag{624}$$

$$\int 2(\tau+\sin(\upsilon))^\tau d\tau = \int((\tau+\sin(\upsilon))^\tau + (\int \cos(\upsilon)d\upsilon)^\tau)d\tau \tag{625}$$

1.2.8 Derivation 7

$$\tau(\nu) = \sin(\nu) \tag{626}$$

$$\frac{d}{d\nu}\tau(\nu) = \frac{d}{d\nu}\sin(\nu) \tag{627}$$

$$\alpha\frac{d}{d\nu}\tau(\nu) = \alpha\frac{d}{d\nu}\sin(\nu) \tag{628}$$

$$\int \alpha\frac{d}{d\nu}\tau(\nu)d\alpha = \int \alpha\frac{d}{d\nu}\sin(\nu)d\alpha \tag{629}$$

$$\frac{d}{d\nu}\tau(\nu) = \cos(\nu) \tag{630}$$

$$\int \alpha\cos(\nu)d\alpha = \int \alpha\frac{d}{d\nu}\sin(\nu)d\alpha \tag{631}$$

1.2.9 Derivation 8

$$o(\alpha,\beta) = -\alpha+\beta \tag{632}$$

$$\frac{\partial}{\partial\beta}o(\alpha,\beta) = \frac{\partial}{\partial\beta}(-\alpha+\beta) \tag{633}$$

$$\frac{\partial^2}{\partial\beta^2}o(\alpha,\beta) = \frac{\partial^2}{\partial\beta^2}(-\alpha+\beta) \tag{634}$$

$$\frac{\partial^2}{\partial\beta^2}o(\alpha,\beta) = 0 \tag{635}$$

$$e^{\frac{\partial^2}{\partial\beta^2}o(\alpha,\beta)} = 1 \tag{636}$$

$$(e^{\frac{\partial^2}{\partial\beta^2}o(\alpha,\beta)})^\alpha = 1 \tag{637}$$

1.2.10 Derivation 9

$$\beta(\kappa,\tau) = \frac{\partial}{\partial\kappa}(\kappa-\tau) \tag{638}$$

$$\beta(\kappa,\tau) = 1 \tag{639}$$

$$\frac{\partial}{\partial\kappa}\beta(\kappa,\tau) = \frac{d}{d\kappa}1 \tag{640}$$

$$\frac{\partial^2}{\partial\kappa^2}(\kappa-\tau) = \frac{d}{d\kappa}1 \tag{641}$$

$$\frac{\partial^2}{\partial\kappa^2}(\kappa-\tau) = \frac{\partial}{\partial\kappa}\beta(\kappa,\tau) \tag{642}$$

$$0 = \frac{\partial}{\partial\kappa}\beta(\kappa,\tau) \tag{643}$$

$$0 = \frac{\partial^2}{\partial\kappa^2}(\kappa-\tau) \tag{644}$$

$$-3\frac{\partial}{\partial\kappa}(\kappa-\tau)-1 = -3\frac{\partial}{\partial\kappa}(\kappa-\tau)+\frac{\partial^2}{\partial\kappa^2}(\kappa-\tau)-1 \tag{645}$$

1.2.11 Derivation 10

$$o(\xi) = \cos(\xi) \tag{646}$$

$$\frac{d}{d\xi}o(\xi) = \frac{d}{d\xi}\cos(\xi) \tag{647}$$

$$\frac{d}{d\xi}o(\xi) = -\sin(\xi) \tag{648}$$

$$-\sin(\xi) = \frac{d}{d\xi}\cos(\xi) \tag{649}$$

$$(-\sin(\xi))^{\xi} = (\frac{d}{d\xi}\cos(\xi))^{\xi} \quad (650)$$

$$(-\sin(\xi))^{2\xi} = (-\sin(\xi))^{\xi}(\frac{d}{d\xi}\cos(\xi))^{\xi} \quad (651)$$

1.2.12 Derivation 11

$$\gamma(\kappa, \upsilon) = \frac{\partial}{\partial\kappa}(\kappa + \upsilon) \quad (652)$$

$$\frac{\partial}{\partial\kappa}\gamma(\kappa, \upsilon) = \frac{\partial^2}{\partial\kappa^2}(\kappa + \upsilon) \quad (653)$$

$$\frac{\partial}{\partial\kappa}\gamma(\kappa, \upsilon) = 0 \quad (654)$$

$$\frac{\partial^2}{\partial\upsilon\partial\kappa}\gamma(\kappa, \upsilon) = \frac{d}{d\upsilon}0 \quad (655)$$

$$(\kappa + \upsilon)\frac{\partial^2}{\partial\upsilon\partial\kappa}\gamma(\kappa, \upsilon) = (\kappa + \upsilon)\frac{d}{d\upsilon}0 \quad (656)$$

1.2.13 Derivation 12

$$\zeta(\gamma) = \log(\gamma) \quad (657)$$

$$\frac{d}{d\gamma}\zeta(\gamma) = \frac{d}{d\gamma}\log(\gamma) \quad (658)$$

$$\frac{d}{d\gamma}\zeta(\gamma) = \frac{1}{\gamma} \quad (659)$$

$$\cos(\frac{d}{d\gamma}\zeta(\gamma)) = \cos(\frac{1}{\gamma}) \quad (660)$$

$$\cos(\frac{d}{d\gamma}\log(\gamma)) = \cos(\frac{1}{\gamma}) \quad (661)$$

1.2.14 Derivation 13

$$\xi(\zeta, \nu) = \frac{\partial}{\partial\nu}\nu\zeta \quad (662)$$

$$\nu\xi(\zeta, \nu) = \nu\frac{\partial}{\partial\nu}\nu\zeta \quad (663)$$

$$\nu\xi(\zeta, \nu) = \nu\zeta \quad (664)$$

$$\nu\xi(\zeta, \nu) - \cos(\sin(o)) = \nu\zeta - \cos(\sin(o)) \quad (665)$$

$$\frac{\nu\xi(\zeta, \nu) - \cos(\sin(o))}{o} = \frac{\nu\zeta - \cos(\sin(o))}{o} \quad (666)$$

1.2.15 Derivation 14

$$\nu(\upsilon) = \cos(\upsilon) \quad (667)$$

$$\frac{d}{d\upsilon}\nu(\upsilon) = \frac{d}{d\upsilon}\cos(\upsilon) \quad (668)$$

$$(\frac{d}{d\upsilon}\nu(\upsilon))^{\upsilon} = (\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} \quad (669)$$

$$(\frac{d}{d\upsilon}\nu(\upsilon))^{\upsilon} = (-\sin(\upsilon))^{\upsilon} \quad (670)$$

$$(\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} = (-\sin(\upsilon))^{\upsilon} \quad (671)$$

$$\frac{d}{d\upsilon}(\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} = \frac{d}{d\upsilon}(-\sin(\upsilon))^{\upsilon} \quad (672)$$

1.2.16 Derivation 15

$$\nu(\tau, \beta) = \log(\beta^{\tau}) \quad (673)$$

$$\zeta(\xi) = \cos(\xi) \quad (674)$$

$$\frac{\zeta(\xi)}{\frac{\partial}{\partial\tau}\nu(\tau, \beta)} = \frac{\cos(\xi)}{\frac{\partial}{\partial\tau}\nu(\tau, \beta)} \quad (675)$$

$$\frac{\zeta(\xi)}{\frac{\partial}{\partial\tau}\log(\beta^{\tau})} = \frac{\cos(\xi)}{\frac{\partial}{\partial\tau}\log(\beta^{\tau})} \quad (676)$$

$$\frac{\zeta(\xi)}{\log(\beta)} = \frac{\cos(\xi)}{\log(\beta)} \quad (677)$$

$$(\frac{\zeta(\xi)}{\log(\beta)})^{\xi} = (\frac{\cos(\xi)}{\log(\beta)})^{\xi} \quad (678)$$

1.2.17 Derivation 16

$$\upsilon(\kappa) = \kappa \quad (679)$$

$$\frac{d}{d\kappa}\upsilon(\kappa) = \frac{d}{d\kappa}\kappa \quad (680)$$

$$\frac{d}{d\kappa}\upsilon(\kappa) = 1 \quad (681)$$

$$1 = \frac{1}{\frac{d}{d\kappa}\upsilon(\kappa)} \quad (682)$$

$$1 = \frac{1}{\frac{d}{d\kappa}\kappa} \quad (683)$$

$$1 = \frac{1}{\frac{d}{d\upsilon(\kappa)}\upsilon(\kappa)} \quad (684)$$

1.2.18 Derivation 17

$$\alpha(\nu) = \cos(\nu) \tag{685}$$

$$\frac{d}{d\nu}\alpha(\nu) = \frac{d}{d\nu}\cos(\nu) \tag{686}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = \frac{d^2}{d\nu^2}\cos(\nu) \tag{687}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = -\cos(\nu) \tag{688}$$

$$\frac{\frac{d^2}{d\nu^2}\alpha(\nu)}{\tau(\nu)} = -\frac{\cos(\nu)}{\tau(\nu)} \tag{689}$$

1.2.19 Derivation 18

$$\alpha(\zeta) = \log(\zeta) \tag{690}$$

$$\frac{d}{d\zeta}\alpha(\zeta) = \frac{d}{d\zeta}\log(\zeta) \tag{691}$$

$$\frac{d}{d\zeta}\alpha(\zeta) = \frac{1}{\zeta} \tag{692}$$

$$\frac{d}{d\zeta}\log(\zeta) = \frac{1}{\zeta} \tag{693}$$

$$\int \frac{d}{d\zeta}\log(\zeta)d\zeta = \int \frac{1}{\zeta}d\zeta \tag{694}$$

1.2.20 Derivation 19

$$\xi(\zeta) = \int e^{\zeta}d\zeta \tag{695}$$

$$0 = -\xi(\zeta) + \int e^{\zeta}d\zeta \tag{696}$$

$$0 = (-\xi(\zeta) + \int e^{\zeta}d\zeta)\int e^{\zeta}d\zeta \tag{697}$$

$$0 = ((-\xi(\zeta) + \int e^{\zeta}d\zeta)^2)\int e^{\zeta}d\zeta \tag{698}$$

$$0 = (\alpha + e^{\zeta})(\alpha - \xi(\zeta) + e^{\zeta})^2 \tag{699}$$

$$0 = (\alpha + e^{\zeta})(\alpha + e^{\zeta} - \int e^{\zeta}d\zeta)^2 \tag{700}$$

1.2.21 Derivation 20

$$o(\beta, \alpha) = \cos(\alpha + \beta) \tag{701}$$

$$\int o(\beta, \alpha)d\alpha = \int \cos(\alpha + \beta)d\alpha \tag{702}$$

$$\int o(\beta, \alpha)d\alpha = \gamma + \sin(\alpha + \beta) \tag{703}$$

$$\int \cos(\alpha + \beta)d\alpha = \gamma + \sin(\alpha + \beta) \tag{704}$$

1.2.22 Derivation 21

$$\upsilon(\tau) = \int e^{\tau}d\tau \tag{705}$$

$$\upsilon(\tau) = \kappa + e^{\tau} \tag{706}$$

$$\kappa + e^{\tau} = \int e^{\tau}d\tau \tag{707}$$

$$\kappa + e^{\tau} = \alpha + e^{\tau} \tag{708}$$

$$\int(\kappa + e^{\tau})d\alpha = \int(\alpha + e^{\tau})d\alpha \tag{709}$$

$$\int \upsilon(\tau)d\alpha = \int(\alpha + e^{\tau})d\alpha \tag{710}$$

$$\int \upsilon(\tau)d\alpha = \frac{\alpha^2}{2} + \alpha e^{\tau} + \iota \tag{711}$$

$$\frac{\alpha^2}{2} + \alpha e^{\tau} + \iota = \int(\alpha + e^{\tau})d\alpha \tag{712}$$

$$\frac{\alpha^2}{2} + \alpha e^{\tau} + \iota = \frac{\alpha^2}{2} + \alpha e^{\tau} + \xi \tag{713}$$

1.2.23 Derivation 22

$$\zeta(\alpha, \nu) = \frac{\partial}{\partial\alpha}\alpha\nu \tag{714}$$

$$\zeta(\alpha, \nu) = \nu \tag{715}$$

$$\nu + \zeta(\alpha, \nu) = \nu + \frac{\partial}{\partial\alpha}\alpha\nu \tag{716}$$

$$\alpha + \nu + \zeta(\alpha, \nu) = \alpha + \nu + \frac{\partial}{\partial\alpha}\alpha\nu \tag{717}$$

$$\int(\alpha+\nu+\zeta(\alpha,\nu))d\alpha=\int(\alpha+\nu+\frac{\partial}{\partial\alpha}\alpha\nu)d\alpha \tag{718}$$

$$\int(\alpha+2\nu)d\alpha=\int(\alpha+\nu+\frac{\partial}{\partial\alpha}\alpha\nu)d\alpha \tag{719}$$

$$\frac{\partial}{\partial\nu}\int(\alpha+2\nu)d\alpha=\frac{\partial}{\partial\nu}\int(\alpha+\nu+\frac{\partial}{\partial\alpha}\alpha\nu)d\alpha \tag{720}$$

1.2.24 Derivation 23

$$\zeta(\beta)=\cos{(e^{\beta})} \tag{721}$$

$$\int\zeta(\beta)d\beta=\int\cos{(e^{\beta})}d\beta \tag{722}$$

$$\iint\zeta(\beta)d\beta d\beta=\iint\cos{(e^{\beta})}d\beta d\beta \tag{723}$$

$$\int\zeta(\beta)d\beta=\kappa+\operatorname{Ci}{(e^{\beta})} \tag{724}$$

$$\int\cos{(e^{\beta})}d\beta=\kappa+\operatorname{Ci}{(e^{\beta})} \tag{725}$$

$$\iint\cos{(e^{\beta})}d\beta d\beta=\int(\kappa+\operatorname{Ci}{(e^{\beta})})d\beta \tag{726}$$

$$\frac{d}{d\beta}\iint\zeta(\beta)d\beta d\beta=\frac{d}{d\beta}\iint\cos{(e^{\beta})}d\beta d\beta \tag{727}$$

$$\frac{d}{d\beta}\iint\zeta(\beta)d\beta d\beta=\frac{\partial}{\partial\beta}\int(\kappa+\operatorname{Ci}{(e^{\beta})})d\beta \tag{728}$$

1.2.25 Derivation 24

$$\gamma(\zeta)=\frac{1}{\zeta} \tag{729}$$

$$\int\gamma(\zeta)d\zeta=\int\frac{1}{\zeta}d\zeta \tag{730}$$

$$\int\gamma(\zeta)d\zeta=o+\log{(\zeta)} \tag{731}$$

$$\int\frac{1}{\zeta}d\zeta=o+\log{(\zeta)} \tag{732}$$

$$-\frac{\beta}{\zeta}+\int\frac{1}{\zeta}d\zeta=-\frac{\beta}{\zeta}+o+\log{(\zeta)} \tag{733}$$

$$\frac{\partial}{\partial\beta}(-\frac{\beta}{\zeta}+\int\frac{1}{\zeta}d\zeta)=\frac{\partial}{\partial\beta}(-\frac{\beta}{\zeta}+o+\log{(\zeta)}) \tag{734}$$

1.2.26 Derivation 25

$$\beta(\tau)=e^{\tau} \tag{735}$$

$$\int\beta(\tau)d\tau=\int e^{\tau}d\tau \tag{736}$$

$$(\int\beta(\tau)d\tau)^{\tau}=(\int e^{\tau}d\tau)^{\tau} \tag{737}$$

$$\frac{d}{d\tau}(\int\beta(\tau)d\tau)^{\tau}=\frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{738}$$

$$\frac{d}{d\tau}(\int\beta(\tau)d\tau)^{\tau}=\frac{\partial}{\partial\tau}(\iota+e^{\tau})^{\tau} \tag{739}$$

$$\frac{\partial}{\partial\tau}(\iota+e^{\tau})^{\tau}=\frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{740}$$

$$\frac{\partial}{\partial\tau}(\iota+\beta(\tau))^{\tau}=\frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{741}$$

1.2.27 Derivation 26

$$\kappa(\upsilon)=\cos{(\upsilon)} \tag{742}$$

$$\int\kappa(\upsilon)d\upsilon=\int\cos{(\upsilon)}d\upsilon \tag{743}$$

$$\frac{d}{d\upsilon}\int\kappa(\upsilon)d\upsilon=\frac{d}{d\upsilon}\int\cos{(\upsilon)}d\upsilon \tag{744}$$

$$\frac{d}{d\upsilon}\int\kappa(\upsilon)d\upsilon=\frac{\partial}{\partial\upsilon}(\alpha+\sin{(\upsilon)}) \tag{745}$$

$$\frac{\partial}{\partial\upsilon}(\alpha+\sin{(\upsilon)})=\frac{d}{d\upsilon}\int\cos{(\upsilon)}d\upsilon \tag{746}$$

1.2.28 Derivation 27

$$\xi(\alpha)=\int\log{(\alpha)}d\alpha \tag{747}$$

$$\frac{d}{d\alpha}\xi(\alpha)=\frac{d}{d\alpha}\int\log{(\alpha)}d\alpha \tag{748}$$

$$\frac{d}{d\alpha}\xi(\alpha)=\frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)}-\alpha+\nu) \tag{749}$$

$$\tau(\alpha,\nu)=\frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)}-\alpha+\nu) \tag{750}$$

$$\tau(\alpha,\nu)=\frac{d}{d\alpha}\xi(\alpha) \tag{751}$$

$$\tau(\alpha,\nu)e^{-\frac{d}{d\alpha}\xi(\alpha)}=e^{-\frac{d}{d\alpha}\xi(\alpha)}\frac{d}{d\alpha}\xi(\alpha) \tag{752}$$

1.2.29 Derivation 28

$$\upsilon(\alpha) = e^{\alpha} \tag{753}$$

$$\frac{d}{d\alpha}\upsilon(\alpha) = \frac{d}{d\alpha}e^{\alpha} \tag{754}$$

$$\frac{d}{d\alpha}\upsilon(\alpha) = e^{\alpha} \tag{755}$$

$$\frac{d}{d\alpha}\upsilon(\alpha) = \frac{d^2}{d\alpha^2}\upsilon(\alpha) \tag{756}$$

$$(\frac{d}{d\alpha}\upsilon(\alpha))^2 = (\frac{d^2}{d\alpha^2}\upsilon(\alpha))^2 \tag{757}$$

$$(\frac{d}{d\alpha}\upsilon(\alpha))^4 = (\frac{d^2}{d\alpha^2}\upsilon(\alpha))^4 \tag{758}$$

1.2.30 Derivation 29

$$\zeta(\iota) = e^{\iota} \tag{759}$$

$$\int \zeta(\iota)d\iota = \int e^{\iota}d\iota \tag{760}$$

$$e^{-\iota}\int \zeta(\iota)d\iota = e^{-\iota}\int e^{\iota}d\iota \tag{761}$$

$$e^{-\iota}\int \zeta(\iota)d\iota = (\alpha + e^{\iota})e^{-\iota} \tag{762}$$

$$\frac{\int \zeta(\iota)d\iota}{\zeta(\iota)} = \frac{\alpha + \zeta(\iota)}{\zeta(\iota)} \tag{763}$$

1.2.31 Derivation 30

$$\xi(\gamma,\tau) = \frac{\partial}{\partial\tau}(\gamma - \tau) \tag{764}$$

$$\xi^{\tau}(\gamma,\tau) = (\frac{\partial}{\partial\tau}(\gamma - \tau))^{\tau} \tag{765}$$

$$\xi^{\tau}(\gamma,\tau) - (\frac{\partial}{\partial\tau}(\gamma - \tau))^{\tau} = 0 \tag{766}$$

$$-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau) = 0 \tag{767}$$

$$\frac{-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau)}{\gamma} = 0 \tag{768}$$

$$\int \frac{-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau)}{\gamma}d\gamma = \int 0 d\gamma \tag{769}$$

1.2.32 Derivation 31

$$\alpha(\iota) = \int \log{(\iota)}d\iota \tag{770}$$

$$\alpha(\iota) = \iota\log{(\iota)} - \iota + \xi \tag{771}$$

$$\int \log{(\iota)}d\iota = \iota\log{(\iota)} - \iota + \xi \tag{772}$$

$$(\int \log{(\iota)}d\iota)^{\xi} = (\iota\log{(\iota)} - \iota + \xi)^{\xi} \tag{773}$$

$$(\int \log{(\iota)}d\iota)^{\xi} = \alpha^{\xi}(\iota) \tag{774}$$

$$\alpha^{\xi}(\iota) = (\iota\log{(\iota)} - \iota + \xi)^{\xi} \tag{775}$$

$$\frac{\partial}{\partial\xi}\alpha^{\xi}(\iota) = \frac{\partial}{\partial\xi}(\iota\log{(\iota)} - \iota + \xi)^{\xi} \tag{776}$$

1.2.33 Derivation 32

$$\beta(\tau) = \sin{(\tau)} \tag{777}$$

$$\frac{d}{d\tau}\beta(\tau) = \frac{d}{d\tau}\sin{(\tau)} \tag{778}$$

$$\frac{d}{d\tau}\beta(\tau) = \cos{(\tau)} \tag{779}$$

$$\sin{(\tau)}\frac{d}{d\tau}\beta(\tau) = \sin{(\tau)}\cos{(\tau)} \tag{780}$$

$$\beta(\tau)\frac{d}{d\tau}\beta(\tau) = \beta(\tau)\cos{(\tau)} \tag{781}$$

1.2.34 Derivation 33

$$\kappa(\zeta) = \sin{(e^{\zeta})} \tag{782}$$

$$\frac{d}{d\zeta}\kappa(\zeta) = \frac{d}{d\zeta}\sin{(e^{\zeta})} \tag{783}$$

$$\frac{d}{d\zeta}\kappa(\zeta) = e^{\zeta}\cos{(e^{\zeta})} \tag{784}$$

$$\frac{d}{d\zeta}\sin{(e^{\zeta})} = e^{\zeta}\cos{(e^{\zeta})} \tag{785}$$

$$e^{-\zeta}\frac{d}{d\zeta}\sin{(e^{\zeta})} = \cos{(e^{\zeta})} \tag{786}$$

1.2.35 Derivation 34

$$\iota(\gamma,\tau,\beta) = \frac{\gamma\tau}{\beta} \tag{787}$$

$$\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) = \frac{\partial}{\partial\tau}\frac{\gamma\tau}{\beta} \tag{788}$$

$$\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) = \frac{\gamma}{\beta} \tag{789}$$

$$\iota(\gamma,\tau,\beta) = \tau\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) \tag{790}$$

1.2.36 Derivation 35

$$\zeta(\nu) = \nu \tag{791}$$

$$1 = \frac{\nu}{\zeta(\nu)} \tag{792}$$

$$\frac{d}{d\nu}1 = \frac{d}{d\nu}\frac{\nu}{\zeta(\nu)} \tag{793}$$

$$\frac{d}{d\nu}1 - \frac{d}{d\nu}\frac{\nu}{\zeta(\nu)} = 0 \tag{794}$$

$$\frac{\nu\frac{d}{d\nu}\zeta(\nu)}{\zeta^2(\nu)} - \frac{1}{\zeta(\nu)} = 0 \tag{795}$$

$$\frac{\frac{d}{d\nu}\nu}{\nu} - \frac{1}{\nu} = 0 \tag{796}$$

$$\frac{\frac{d}{d\zeta(\nu)}\zeta(\nu)}{\zeta(\nu)} - \frac{1}{\zeta(\nu)} = 0 \tag{797}$$

1.2.37 Derivation 36

$$\beta(\xi,\iota,\alpha) = \alpha - \iota + \xi \tag{798}$$

$$\int \beta(\xi,\iota,\alpha)d\alpha = \int(\alpha - \iota + \xi)d\alpha \tag{799}$$

$$\int \beta(\xi,\iota,\alpha)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \tag{800}$$

$$\int(\alpha - \iota + \xi)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \tag{801}$$

1.2.38 Derivation 37

$$\zeta(\beta) = e^\beta \tag{802}$$

$$\zeta(\beta) + e^\beta = 2e^\beta \tag{803}$$

$$\frac{d}{d\beta}(\zeta(\beta) + e^\beta) = \frac{d}{d\beta}2e^\beta \tag{804}$$

$$e^\beta + \frac{d}{d\beta}\zeta(\beta) = 2e^\beta \tag{805}$$

$$\frac{d}{d\beta}(\zeta(\beta) + e^\beta) = \frac{d}{d\beta}(e^\beta + \frac{d}{d\beta}\zeta(\beta)) \tag{806}$$

1.2.39 Derivation 38

$$\gamma(\xi) = \sin(\xi) \tag{807}$$

$$\frac{d}{d\xi}\gamma(\xi) = \frac{d}{d\xi}\sin(\xi) \tag{808}$$

$$\sin(\xi)\frac{d}{d\xi}\gamma(\xi) = \sin(\xi)\frac{d}{d\xi}\sin(\xi) \tag{809}$$

$$\sin(\xi)\frac{d}{d\xi}\gamma(\xi) = \sin(\xi)\cos(\xi) \tag{810}$$

$$\sin(\xi)\frac{d}{d\xi}\sin(\xi) = \sin(\xi)\cos(\xi) \tag{811}$$

$$\gamma(\xi)\frac{d}{d\xi}\gamma(\xi) = \gamma(\xi)\cos(\xi) \tag{812}$$

1.2.40 Derivation 39

$$\gamma(\beta,\nu) = \beta + \nu \tag{813}$$

$$\int \gamma(\beta,\nu)d\nu = \int(\beta + \nu)d\nu \tag{814}$$

$$(\int \gamma(\beta,\nu)d\nu)^\beta = (\int(\beta + \nu)d\nu)^\beta \tag{815}$$

$$(\int \gamma(\beta,\nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \tag{816}$$

$$(\int(\beta + \nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \tag{817}$$

1.2.41 Derivation 40

$$\upsilon(\zeta, \tau) = \frac{\partial}{\partial \tau} \frac{\tau}{\zeta} \tag{818}$$

$$\upsilon(\zeta, \tau) - \frac{\partial}{\partial \tau} \frac{\tau}{\zeta} = 0 \tag{819}$$

$$\upsilon(\zeta, \tau) = \frac{1}{\zeta} \tag{820}$$

$$-\frac{\partial}{\partial \tau} \frac{\tau}{\zeta} + \frac{1}{\zeta} = 0 \tag{821}$$

1.2.42 Derivation 41

$$o(\xi) = e^{e^{\xi}} \tag{822}$$

$$\int o(\xi) d\xi = \int e^{e^{\xi}} d\xi \tag{823}$$

$$\int o(\xi) d\xi = \iota + \operatorname{Ei}\left(e^{\xi}\right) \tag{824}$$

$$0 = -\int o(\xi) d\xi + \int e^{e^{\xi}} d\xi \tag{825}$$

$$0 = \zeta + \operatorname{Ei}\left(e^{\xi}\right) - \int o(\xi) d\xi \tag{826}$$

$$0 = -\iota + \zeta \tag{827}$$

1.2.43 Derivation 42

$$\upsilon(\kappa, \nu) = \kappa \cos{(\nu)} \tag{828}$$

$$\frac{\partial}{\partial \kappa} \upsilon(\kappa, \nu) = \frac{\partial}{\partial \kappa} \kappa \cos{(\nu)} \tag{829}$$

$$(\frac{\partial}{\partial \kappa} \upsilon(\kappa, \nu))^{\nu} = (\frac{\partial}{\partial \kappa} \kappa \cos{(\nu)})^{\nu} \tag{830}$$

$$(\frac{\partial}{\partial \kappa} \upsilon(\kappa, \nu))^{\nu} = \cos^{\nu}{(\nu)} \tag{831}$$

$$\cos^{\nu}{(\nu)} = (\frac{\partial}{\partial \kappa} \kappa \cos{(\nu)})^{\nu} \tag{832}$$

1.2.44 Derivation 43

$$\alpha(\iota) = \cos{(\iota)} \tag{833}$$

$$\alpha(\iota) + \int \cos{(\iota)} d\iota = \cos{(\iota)} + \int \cos{(\iota)} d\iota \tag{834}$$

$$o + \alpha(\iota) + \sin{(\iota)} = o + \sin{(\iota)} + \cos{(\iota)} \tag{835}$$

$$\int (o + \alpha(\iota) + \sin{(\iota)}) d\iota = \int (o + \sin{(\iota)} + \cos{(\iota)}) d\iota \tag{836}$$

$$-\alpha(\iota) + \int (o + \alpha(\iota) + \sin{(\iota)}) d\iota - \int \cos{(\iota)} d\iota = -\alpha(\iota) + \int (o + \sin \tag{837}$$

1.2.45 Derivation 44

$$o(\xi, \zeta) = \frac{\partial}{\partial \zeta}(\xi + \zeta) \tag{838}$$

$$\zeta o(\xi, \zeta) = \zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) \tag{839}$$

$$\zeta o(\xi, \zeta) = \zeta \tag{840}$$

$$(\zeta o(\xi, \zeta))^{\zeta} = \zeta^{\zeta} \tag{841}$$

$$\zeta o(\xi, \zeta) + (\zeta o(\xi, \zeta))^{\zeta} = \zeta o(\xi, \zeta) + \zeta^{\zeta} \tag{842}$$

$$\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) + (\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta))^{\zeta} = \zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) + \zeta^{\zeta} \tag{843}$$

1.2.46 Derivation 45

$$\zeta(\gamma, o) = \frac{o}{\gamma} \tag{844}$$

$$\frac{\partial}{\partial \gamma} \zeta(\gamma, o) = \frac{\partial}{\partial \gamma} \frac{o}{\gamma} \tag{845}$$

$$\frac{\partial}{\partial \gamma} \zeta(\gamma, o) = -\frac{o}{\gamma^{2}} \tag{846}$$

$$\frac{\partial}{\partial \gamma} \frac{o}{\gamma} = -\frac{o}{\gamma^{2}} \tag{847}$$

$$-o + \frac{\partial}{\partial \gamma} \frac{o}{\gamma} = -o - \frac{o}{\gamma^{2}} \tag{848}$$

1.2.47 Derivation 46

$$\tau(\kappa) = \sin(\kappa) \tag{849}$$

$$\int \tau(\kappa)d\kappa = \int \sin(\kappa)d\kappa \tag{850}$$

$$\int \tau(\kappa)d\kappa = \zeta - \cos(\kappa) \tag{851}$$

$$\int \sin(\kappa)d\kappa = \zeta - \cos(\kappa) \tag{852}$$

$$-\frac{\int \sin(\kappa)d\kappa}{\cos(\kappa)} = -\frac{\zeta - \cos(\kappa)}{\cos(\kappa)} \tag{853}$$

1.2.48 Derivation 47

$$o(\kappa) = \kappa \tag{854}$$

$$\kappa o(\kappa) = \kappa^2 \tag{855}$$

$$\int \kappa o(\kappa)d\kappa = \int \kappa^2 d\kappa \tag{856}$$

$$\int \kappa o(\kappa)d\kappa = \iota + \frac{\kappa^3}{3} \tag{857}$$

$$\int \kappa^2 d\kappa = \iota + \frac{\kappa^3}{3} \tag{858}$$

$$\frac{\kappa^3}{3} + \xi = \iota + \frac{\kappa^3}{3} \tag{859}$$

1.2.49 Derivation 48

$$o(\upsilon) = \int \log(\upsilon)d\upsilon \tag{860}$$

$$o(\upsilon) = \beta + \upsilon\log(\upsilon) - \upsilon \tag{861}$$

$$-\beta + o(\upsilon) = \upsilon\log(\upsilon) - \upsilon \tag{862}$$

$$(-\beta + o(\upsilon))^{\upsilon} = (\upsilon\log(\upsilon) - \upsilon)^{\upsilon} \tag{863}$$

$$\frac{\partial}{\partial\beta}(-\beta + o(\upsilon))^{\upsilon} = \frac{d}{d\beta}(\upsilon\log(\upsilon) - \upsilon)^{\upsilon} \tag{864}$$

1.2.50 Derivation 49

$$\upsilon(\iota) = \int \log(\iota)d\iota \tag{865}$$

$$\upsilon(\iota) = \iota\log(\iota) - \iota + \zeta \tag{866}$$

$$\iota\log(\iota) - \iota + \zeta = \int \log(\iota)d\iota \tag{867}$$

$$\iota\log(\iota) + \zeta = \iota + \int \log(\iota)d\iota \tag{868}$$

1.2.51 Derivation 50

$$\gamma(\beta) = \beta \tag{869}$$

$$\int \gamma(\beta)d\beta = \int \beta d\beta \tag{870}$$

$$\int \gamma(\beta)d\beta = \frac{\beta^2}{2} + o \tag{871}$$

$$\int \gamma(C_2)d\gamma(C_2) = o + \frac{\gamma^2(\beta)}{2} \tag{872}$$

$$\alpha + \frac{\gamma^2(\beta)}{2} = o + \frac{\gamma^2(\beta)}{2} \tag{873}$$

$$\alpha + \frac{\beta^2}{2} = \frac{\beta^2}{2} + o \tag{874}$$

1.2.52 Derivation 51

$$\nu(\xi) = \log(\xi) \tag{875}$$

$$\int \nu(\xi)d\xi = \int \log(\xi)d\xi \tag{876}$$

$$\int \nu(\xi)d\xi = \kappa + \xi\log(\xi) - \xi \tag{877}$$

$$\tau(\xi) = \nu(\xi) - \int \nu(\xi)d\xi \tag{878}$$

$$\tau(\xi) = -\kappa - \xi\log(\xi) + \xi + \nu(\xi) \tag{879}$$

1.2.53 Derivation 52

$$\upsilon(\xi,\kappa) = \xi^{\kappa} \tag{880}$$

$$\frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \frac{\partial}{\partial\kappa}\xi^{\kappa} \tag{881}$$

$$\xi + \frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \xi + \frac{\partial}{\partial\kappa}\xi^{\kappa} \tag{882}$$

$$\xi + \frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \xi + \xi^{\kappa}\log(\xi) \tag{883}$$

$$\xi + \frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \xi + \upsilon(\xi,\kappa)\log(\xi) \tag{884}$$

$$\xi + \frac{\partial}{\partial\kappa}\xi^{\kappa} = \xi + \xi^{\kappa}\log(\xi) \tag{885}$$

1.2.54 Derivation 53

$$\kappa(\nu) = e^{\nu} \tag{886}$$

$$\frac{d}{d\nu}\kappa(\nu) = \frac{d}{d\nu}e^{\nu} \tag{887}$$

$$(\frac{d}{d\nu}\kappa(\nu))^{\nu} = (\frac{d}{d\nu}e^{\nu})^{\nu} \tag{888}$$

$$(\frac{d}{d\nu}\kappa(\nu))^{\nu} = (e^{\nu})^{\nu} \tag{889}$$

$$(\frac{d}{d\nu}e^{\nu})^{\nu} = (e^{\nu})^{\nu} \tag{890}$$

$$(\frac{d}{d\nu}\kappa(\nu))^{\nu} = \kappa^{\nu}(\nu) \tag{891}$$

1.2.55 Derivation 54

$$\zeta(\tau,\xi) = \frac{\xi}{\tau} \tag{892}$$

$$\frac{\zeta(\tau,\xi)}{\tau} = \frac{\xi}{\tau^2} \tag{893}$$

$$\frac{\partial}{\partial\tau}\frac{\zeta(\tau,\xi)}{\tau} = \frac{\partial}{\partial\tau}\frac{\xi}{\tau^2} \tag{894}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} - \frac{\zeta(\tau,\xi)}{\tau^2} = -\frac{2\xi}{\tau^3} \tag{895}$$

$$\frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^3} = -\frac{2\xi}{\tau^3} \tag{896}$$

1.2.56 Derivation 55

$$\tau(\iota) = \log(\iota) \tag{897}$$

$$\tau^{\iota}(\iota) = \log(\iota)^{\iota} \tag{898}$$

$$\frac{d}{d\iota}\tau^{\iota}(\iota) = \frac{d}{d\iota}\log(\iota)^{\iota} \tag{899}$$

$$(\frac{\iota\frac{d}{d\iota}\tau(\iota)}{\tau(\iota)} + \log(\tau(\iota)))\tau^{\iota}(\iota) = (\log(\log(\iota)) + \frac{1}{\log(\iota)})\log(\iota)^{\iota} \tag{900}$$

$$(\frac{\iota\frac{d}{d\iota}\tau(\iota)}{\tau(\iota)} + \log(\tau(\iota)))\log(\iota)^{\iota} = (\log(\log(\iota)) + \frac{1}{\log(\iota)})\log(\iota)^{\iota} \tag{901}$$

1.2.57 Derivation 56

$$\kappa(\beta) = \sin(\beta) \tag{902}$$

$$\frac{d}{d\beta}\kappa(\beta) = \frac{d}{d\beta}\sin(\beta) \tag{903}$$

$$\frac{d}{d\beta}\kappa(\beta) = \cos(\beta) \tag{904}$$

$$\kappa(\beta) + \frac{d}{d\beta}\sin(\beta) = \sin(\beta) + \frac{d}{d\beta}\sin(\beta) \tag{905}$$

$$\kappa(\beta) + \frac{d}{d\beta}\kappa(\beta) = \sin(\beta) + \frac{d}{d\beta}\kappa(\beta) \tag{906}$$

$$\kappa(\beta) + \cos(\beta) = \sin(\beta) + \cos(\beta) \tag{907}$$

1.2.58 Derivation 57

$$o(\alpha,\xi,\zeta) = \frac{\alpha\zeta}{\xi} \tag{908}$$

$$\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) = \frac{\partial}{\partial\zeta}\frac{\alpha\zeta}{\xi} \tag{909}$$

$$\kappa(\alpha,\xi,\zeta) = \frac{\alpha\zeta}{\xi} \tag{910}$$

$$\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) = \frac{\alpha}{\xi} \tag{911}$$

$$\kappa(\alpha,\xi,\zeta) = \zeta\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) \tag{912}$$

1.2.59 Derivation 58

$$\kappa(\beta) = \frac{1}{\beta} \tag{913}$$

$$\int \kappa(\beta) d\beta = \int \frac{1}{\beta} d\beta \tag{914}$$

$$(\int \kappa(\beta) d\beta)^{\beta} = (\int \frac{1}{\beta} d\beta)^{\beta} \tag{915}$$

$$\int \kappa(\beta) d\beta = \iota + \log{(\beta)} \tag{916}$$

$$(\iota + \log{(\beta)})^{\beta} = (\int \frac{1}{\beta} d\beta)^{\beta} \tag{917}$$

$$(\iota + \log{(\beta)})^{\beta} = (\int \kappa(\beta) d\beta)^{\beta} \tag{918}$$

1.2.60 Derivation 59

$$\iota(\upsilon) = \log{(\upsilon)} \tag{919}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{d}{d\upsilon}\log{(\upsilon)} \tag{920}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{1}{\upsilon} \tag{921}$$

$$\frac{1}{\upsilon} = \frac{d}{d\upsilon}\log{(\upsilon)} \tag{922}$$

$$(\frac{1}{\upsilon})^{\upsilon} = (\frac{d}{d\upsilon}\log{(\upsilon)})^{\upsilon} \tag{923}$$

$$((\frac{1}{\upsilon})^{\upsilon})^{\upsilon} = ((\frac{d}{d\upsilon}\log{(\upsilon)})^{\upsilon})^{\upsilon} \tag{924}$$

$$(((\frac{1}{\upsilon})^{\upsilon})^{\upsilon})^{\upsilon} = (((\frac{d}{d\upsilon}\log{(\upsilon)})^{\upsilon})^{\upsilon})^{\upsilon} \tag{925}$$

1.2.61 Derivation 60

$$\kappa(\beta) = e^{\beta} \tag{926}$$

$$1 = \frac{e^{\beta}}{\kappa(\beta)} \tag{927}$$

$$\int 1 d\beta = \int \frac{e^{\beta}}{\kappa(\beta)} d\beta \tag{928}$$

$$\beta + \zeta = \int \frac{e^{\beta}}{\kappa(\beta)} d\beta \tag{929}$$

$$-\beta - \zeta = -\int \frac{e^{\beta}}{\kappa(\beta)} d\beta \tag{930}$$

1.2.62 Derivation 61

$$\alpha(\nu, \tau) = \frac{\partial}{\partial \nu}(\nu + \tau) \tag{931}$$

$$\frac{\partial}{\partial \nu}\alpha(\nu, \tau) = \frac{\partial^2}{\partial \nu^2}(\nu + \tau) \tag{932}$$

$$\frac{\partial}{\partial \nu}\alpha(\nu, \tau) = 0 \tag{933}$$

$$\frac{\partial^2}{\partial \nu^2}(\nu + \tau) = 0 \tag{934}$$

1.2.63 Derivation 62

$$\xi(\beta, \zeta) = \beta - \zeta \tag{935}$$

$$\frac{\partial}{\partial \zeta}\xi(\beta, \zeta) = \frac{\partial}{\partial \zeta}(\beta - \zeta) \tag{936}$$

$$\frac{\partial}{\partial \zeta}\xi(\beta, \zeta) = -1 \tag{937}$$

$$-1 = \frac{\partial}{\partial \zeta}(\beta - \zeta) \tag{938}$$

$$\int (-1) d\zeta = \int \frac{\partial}{\partial \zeta}(\beta - \zeta) d\zeta \tag{939}$$

1.2.64 Derivation 63

$$\tau(\alpha, o) = \log{(o^{\alpha})} \tag{940}$$

$$\int \tau(\alpha, o) d\alpha = \int \log{(o^{\alpha})} d\alpha \tag{941}$$

$$\int \tau(\alpha, o) d\alpha = \frac{\alpha^2 \log{(o)}}{2} + \kappa \tag{942}$$

$$\int \log{(o^{\alpha})} d\alpha = \frac{\alpha^2 \log{(o)}}{2} + \kappa \tag{943}$$

$$-(e^{o})^{o} + \int \log{(o^{\alpha})} d\alpha = \frac{\alpha^2 \log{(o)}}{2} + \kappa - (e^{o})^{o} \tag{944}$$

1.2.65 Derivation 64

$$\beta(\upsilon) = \log(\upsilon) \tag{945}$$

$$\int \beta(\upsilon)d\upsilon = \int \log(\upsilon)d\upsilon \tag{946}$$

$$0 = -\int \beta(\upsilon)d\upsilon + \int \log(\upsilon)d\upsilon \tag{947}$$

$$0 = \gamma + \upsilon\log(\upsilon) - \upsilon - \int \beta(\upsilon)d\upsilon \tag{948}$$

$$0 = \gamma + \upsilon\beta(\upsilon) - \upsilon - \int \beta(\upsilon)d\upsilon \tag{949}$$

$$0 = \gamma + \upsilon\beta(\upsilon) - \upsilon - \int \log(\upsilon)d\upsilon \tag{950}$$

$$0 = -\alpha + \gamma + \upsilon\beta(\upsilon) - \upsilon\log(\upsilon) \tag{951}$$

$$\frac{d}{d\gamma}0 = \frac{\partial}{\partial\gamma}(-\alpha + \gamma + \upsilon\beta(\upsilon) - \upsilon\log(\upsilon)) \tag{952}$$

1.2.66 Derivation 65

$$\tau(\alpha) = \cos(\alpha) \tag{953}$$

$$\frac{d}{d\alpha}\tau(\alpha) = \frac{d}{d\alpha}\cos(\alpha) \tag{954}$$

$$\frac{d}{d\alpha}\tau(\alpha) = -\sin(\alpha) \tag{955}$$

$$\frac{d}{d\alpha}\cos(\alpha) = -\sin(\alpha) \tag{956}$$

$$\frac{d^2}{d\alpha^2}\cos(\alpha) = \frac{d}{d\alpha} - \sin(\alpha) \tag{957}$$

$$\frac{d^3}{d\alpha^3}\cos(\alpha) = \frac{d^2}{d\alpha^2} - \sin(\alpha) \tag{958}$$

1.2.67 Derivation 66

$$\nu(o) = \sin(e^o) \tag{959}$$

$$\frac{d}{do}\nu(o) = \frac{d}{do}\sin(e^o) \tag{960}$$

$$2\frac{d}{do}\nu(o) = \frac{d}{do}\nu(o) + \frac{d}{do}\sin(e^o) \tag{961}$$

$$2\frac{d}{do}\nu(o) = e^o\cos(e^o) + \frac{d}{do}\nu(o) \tag{962}$$

$$\int 2\frac{d}{do}\nu(o)do = \int (e^o\cos(e^o) + \frac{d}{do}\nu(o))do \tag{963}$$

1.2.68 Derivation 67

$$\nu(\iota) = \frac{d}{d\iota}e^\iota \tag{964}$$

$$\nu(\iota) - 1 = \frac{d}{d\iota}e^\iota - 1 \tag{965}$$

$$\nu(\iota) = e^\iota \tag{966}$$

$$e^\iota = \frac{d}{d\iota}e^\iota \tag{967}$$

$$\nu(\iota) - 1 = \frac{d^2}{d\iota^2}e^\iota - 1 \tag{968}$$

1.2.69 Derivation 68

$$\alpha(\upsilon) = \cos(\upsilon) \tag{969}$$

$$\frac{d}{d\upsilon}\alpha(\upsilon) = \frac{d}{d\upsilon}\cos(\upsilon) \tag{970}$$

$$\frac{d}{d\upsilon}\alpha(\upsilon) - \frac{d}{d\upsilon}\cos(\upsilon) = 0 \tag{971}$$

$$\sin(\upsilon) + \frac{d}{d\upsilon}\alpha(\upsilon) = 0 \tag{972}$$

$$\sin(\upsilon) + \frac{d}{d\upsilon}\cos(\upsilon) = 0 \tag{973}$$

$$\int (\sin(\upsilon) + \frac{d}{d\upsilon}\cos(\upsilon))d\upsilon = \int 0d\upsilon \tag{974}$$

$$\int (\sin(\upsilon) + \frac{d}{d\upsilon}\cos(\upsilon))d\upsilon - 1 = \int 0d\upsilon - 1 \tag{975}$$

$$\iota - 1 = \int 0 dv - 1 \tag{976}$$

$$\iota - 1 = \int (\sin(v) + \frac{d}{dv}\cos(v))dv - 1 \tag{977}$$

1.2.70 Derivation 69

$$\tau(v) = \sin(v) \tag{978}$$

$$\frac{d}{dv}\tau(v) = \frac{d}{dv}\sin(v) \tag{979}$$

$$\int \frac{d}{dv}\tau(v)dv = \int \frac{d}{dv}\sin(v)dv \tag{980}$$

$$\iota + \tau(v) = \alpha + \sin(v) \tag{981}$$

$$\iota + \tau(v) = \alpha + \tau(v) \tag{982}$$

$$\iota + \sin(v) = \alpha + \sin(v) \tag{983}$$

$$\alpha + \iota + 2\sin(v) = 2\alpha + 2\sin(v) \tag{984}$$

$$\frac{\partial}{\partial v}(\alpha + \iota + 2\sin(v)) = \frac{\partial}{\partial v}(2\alpha + 2\sin(v)) \tag{985}$$

1.2.71 Derivation 70

$$\gamma(\zeta) = \cos(\zeta) \tag{986}$$

$$\gamma^2(\zeta) = \gamma(\zeta)\cos(\zeta) \tag{987}$$

$$1 = \frac{\cos(\zeta)}{\gamma(\zeta)} \tag{988}$$

$$\gamma(\zeta)\cos(\zeta) = \cos^2(\zeta) \tag{989}$$

$$\gamma^2(\zeta) = \cos^2(\zeta) \tag{990}$$

$$\int \gamma^2(\zeta)d\zeta = \int \cos^2(\zeta)d\zeta \tag{991}$$

$$\int \gamma^2(\zeta)d\zeta = \tau + \frac{\zeta}{2} + \frac{\sin(\zeta)\cos(\zeta)}{2} \tag{992}$$

$$\tau + \frac{\zeta}{2} + \frac{\sin(\zeta)\cos(\zeta)}{2} = \int \cos^2(\zeta)d\zeta \tag{993}$$

1.2.72 Derivation 71

$$\gamma(\beta, \kappa) = \beta - \kappa \tag{994}$$

$$\kappa + \gamma(\beta, \kappa) = \beta \tag{995}$$

$$\frac{\partial}{\partial \beta}(\kappa + \gamma(\beta, \kappa)) = \frac{d}{d\beta}\beta \tag{996}$$

$$\frac{\partial}{\partial \beta}\gamma(\beta, \kappa) = 1 \tag{997}$$

$$(\frac{\partial}{\partial \beta}\gamma(\beta, \kappa))^\beta = 1 \tag{998}$$

$$((\frac{\partial}{\partial \beta}\gamma(\beta, \kappa))^\beta)^\beta = 1 \tag{999}$$

$$(((\frac{\partial}{\partial \beta}\gamma(\beta, \kappa))^\beta)^\beta)^\beta = 1 \tag{1000}$$

1.2.73 Derivation 72

$$\kappa(\iota) = \cos(\iota) \tag{1001}$$

$$\kappa(\iota)\cos(\iota) = \cos^2(\iota) \tag{1002}$$

$$\int \kappa(\iota)\cos(\iota)d\iota = \int \cos^2(\iota)d\iota \tag{1003}$$

$$\int \kappa(\iota)\cos(\iota)d\iota = \frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} \tag{1004}$$

$$\frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} = \int \cos^2(\iota)d\iota \tag{1005}$$

1.2.74 Derivation 73

$$\zeta(\kappa, \alpha) = \alpha\kappa \tag{1006}$$

$$-\alpha + \zeta(\kappa, \alpha) = \alpha\kappa - \alpha \tag{1007}$$

$$\frac{\partial}{\partial \kappa}(-\alpha + \zeta(\kappa, \alpha)) = \frac{\partial}{\partial \kappa}(\alpha\kappa - \alpha) \tag{1008}$$

$$\frac{\partial}{\partial \kappa}\zeta(\kappa, \alpha) = \alpha \tag{1009}$$

$$\frac{\partial^2}{\partial \kappa^2}\zeta(\kappa, \alpha) = \frac{d}{d\kappa}\alpha \tag{1010}$$

1.2.75 Derivation 74

$$\beta(\alpha, o, \nu) = o(\alpha + \nu) \tag{1011}$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \frac{\partial}{\partial o}o(\alpha + \nu) \tag{1012}$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \alpha + \nu \tag{1013}$$

$$\frac{\frac{\partial}{\partial o}\beta(\alpha, o, \nu)}{\nu} = \frac{\alpha + \nu}{\nu} \tag{1014}$$

1.2.76 Derivation 75

$$\iota(\alpha) = \sin(\alpha) \tag{1015}$$

$$\int \iota(\alpha)d\alpha = \int \sin(\alpha)d\alpha \tag{1016}$$

$$\upsilon(\alpha) = (\int \iota(\alpha)d\alpha)^2 \tag{1017}$$

$$\upsilon(\alpha) = (\int \sin(\alpha)d\alpha)^2 \tag{1018}$$

$$\upsilon(\alpha) = (\xi - \cos(\alpha))^2 \tag{1019}$$

$$(\int \iota(\alpha)d\alpha)^2 = (\int \sin(\alpha)d\alpha)^2 \tag{1020}$$

$$(\int \iota(\alpha)d\alpha)^2 = (\xi - \cos(\alpha))^2 \tag{1021}$$

$$(\int \sin(\alpha)d\alpha)^2 = (\xi - \cos(\alpha))^2 \tag{1022}$$

1.2.77 Derivation 76

$$\kappa(\xi) = \sin(\xi) \tag{1023}$$

$$\frac{d}{d\xi}\kappa(\xi) = \frac{d}{d\xi}\sin(\xi) \tag{1024}$$

$$\frac{d}{d\xi}\kappa(\xi) = \cos(\xi) \tag{1025}$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = \frac{d}{d\xi}\cos(\xi) \tag{1026}$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = -\sin(\xi) \tag{1027}$$

1.2.78 Derivation 77

$$\kappa(\alpha) = e^{\sin(\alpha)} \tag{1028}$$

$$\frac{d}{d\alpha}\kappa(\alpha) = \frac{d}{d\alpha}e^{\sin(\alpha)} \tag{1029}$$

$$\frac{d}{d\alpha}\kappa(\alpha) = e^{\sin(\alpha)}\cos(\alpha) \tag{1030}$$

$$-\kappa(\alpha) + \frac{d}{d\alpha}\kappa(\alpha) = -\kappa(\alpha) + e^{\sin(\alpha)}\cos(\alpha) \tag{1031}$$

$$e^{-\kappa(\alpha)+\frac{d}{d\alpha}\kappa(\alpha)} = e^{-\kappa(\alpha)+e^{\sin(\alpha)}\cos(\alpha)} \tag{1032}$$

$$(e^{-\kappa(\alpha)+\frac{d}{d\alpha}\kappa(\alpha)})^\alpha = (e^{-\kappa(\alpha)+e^{\sin(\alpha)}\cos(\alpha)})^\alpha \tag{1033}$$

1.2.79 Derivation 78

$$\beta(\upsilon) = \cos(\upsilon) \tag{1034}$$

$$\int \beta(\upsilon)d\upsilon = \int \cos(\upsilon)d\upsilon \tag{1035}$$

$$\int \beta(\upsilon)d\upsilon + 1 = \int \cos(\upsilon)d\upsilon + 1 \tag{1036}$$

$$\int \beta(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \tag{1037}$$

$$\int \cos(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \tag{1038}$$

$$(\int \cos(\upsilon)d\upsilon + 1)^\gamma = (\gamma + \sin(\upsilon) + 1)^\gamma \tag{1039}$$

$$(\tau + \sin(\upsilon) + 1)^\gamma = (\gamma + \sin(\upsilon) + 1)^\gamma \tag{1040}$$

1.2.80 Derivation 79

$$\alpha(o) = \sin(o) \tag{1041}$$

$$0 = -\alpha(o) + \sin(o) \tag{1042}$$

$$\frac{d}{do}0 = \frac{d}{do}(-\alpha(o) + \sin(o)) \tag{1043}$$

$$0 = \cos(o) - \frac{d}{do}\alpha(o) \tag{1044}$$

$$\int 0 do = \int (\cos(o) - \frac{d}{do}\alpha(o))do \tag{1045}$$

1.2.81 Derivation 80

$$\xi(\beta,\upsilon)=\frac{\upsilon}{\beta} \tag{1046}$$

$$\frac{\partial}{\partial\beta}\xi(\beta,\upsilon)=\frac{\partial}{\partial\beta}\frac{\upsilon}{\beta} \tag{1047}$$

$$\frac{\partial}{\partial\beta}\xi(\beta,\upsilon)=-\frac{\upsilon}{\beta^2} \tag{1048}$$

$$\int\frac{\partial}{\partial\beta}\xi(\beta,\upsilon)d\upsilon=\int-\frac{\upsilon}{\beta^2}d\upsilon \tag{1049}$$

$$0=\int-\frac{\upsilon}{\beta^2}d\upsilon-\int\frac{\partial}{\partial\beta}\xi(\beta,\upsilon)d\upsilon \tag{1050}$$

$$\int\frac{\partial}{\partial\beta}\frac{\upsilon}{\beta}d\upsilon=\int-\frac{\upsilon}{\beta^2}d\upsilon \tag{1051}$$

$$0=\int\frac{\partial}{\partial\beta}\frac{\upsilon}{\beta}d\upsilon-\int\frac{\partial}{\partial\beta}\xi(\beta,\upsilon)d\upsilon \tag{1052}$$

1.2.82 Derivation 81

$$\beta(\zeta)=\int\sin(\zeta)d\zeta \tag{1053}$$

$$\beta(\zeta)=\alpha-\cos(\zeta) \tag{1054}$$

$$\alpha-\cos(\zeta)=\int\sin(\zeta)d\zeta \tag{1055}$$

$$-\beta(\zeta)=-\int\sin(\zeta)d\zeta \tag{1056}$$

$$-\beta(\zeta)=-\alpha+\cos(\zeta) \tag{1057}$$

$$-\beta(\zeta)=-\upsilon+\cos(\zeta) \tag{1058}$$

$$-\alpha+\cos(\zeta)=-\upsilon+\cos(\zeta) \tag{1059}$$

$$(-\beta(\zeta))^{\upsilon}=(-\upsilon+\cos(\zeta))^{\upsilon} \tag{1060}$$

$$(-\beta(\zeta))^{\upsilon}=(-\alpha+\cos(\zeta))^{\upsilon} \tag{1061}$$

1.2.83 Derivation 82

$$\upsilon(\xi)=\frac{d}{d\xi}\sin(\xi) \tag{1062}$$

$$\upsilon(\xi)=\cos(\xi) \tag{1063}$$

$$\upsilon(\xi)\sin(\xi)=\sin(\xi)\frac{d}{d\xi}\sin(\xi) \tag{1064}$$

$$\cos(\xi)=\frac{d}{d\xi}\sin(\xi) \tag{1065}$$

$$\upsilon(\xi)\sin(\xi)=\sin(\xi)\cos(\xi) \tag{1066}$$

1.2.84 Derivation 83

$$\upsilon(\kappa,\tau,o)=\frac{\kappa}{o}+\tau \tag{1067}$$

$$0=\frac{\kappa}{o}+\tau-\upsilon(\kappa,\tau,o) \tag{1068}$$

$$\frac{d}{d\kappa}0=\frac{\partial}{\partial\kappa}(\frac{\kappa}{o}+\tau-\upsilon(\kappa,\tau,o)) \tag{1069}$$

$$0=-\frac{\partial}{\partial\kappa}\upsilon(\kappa,\tau,o)+\frac{1}{o} \tag{1070}$$

$$0=-\frac{\partial}{\partial\kappa}(\frac{\kappa}{o}+\tau)+\frac{1}{o} \tag{1071}$$

1.2.85 Derivation 84

$$o(\beta)=\int e^{\beta}d\beta \tag{1072}$$

$$o(\beta)e^{\beta}=e^{\beta}\int e^{\beta}d\beta \tag{1073}$$

$$o(\beta)=\tau+e^{\beta} \tag{1074}$$

$$(\tau+e^{\beta})e^{\beta}=e^{\beta}\int e^{\beta}d\beta \tag{1075}$$

$$(\tau+e^{\beta})e^{\beta}=(\zeta+e^{\beta})e^{\beta} \tag{1076}$$

$$(\zeta+e^{\beta})e^{\beta}=e^{\beta}\int e^{\beta}d\beta \tag{1077}$$

$$((\zeta+e^{\beta})e^{\beta})^{\zeta}=(e^{\beta}\int e^{\beta}d\beta)^{\zeta} \tag{1078}$$

$$e^{((\zeta+e^{\beta})e^{\beta})^{\zeta}}=e^{(e^{\beta}\int e^{\beta}d\beta)^{\zeta}} \tag{1079}$$

1.2.86 Derivation 85

$$\beta(\zeta) = e^{\zeta} \tag{1080}$$

$$\zeta + \beta(\zeta) = \zeta + e^{\zeta} \tag{1081}$$

$$\frac{d}{d\zeta}\beta(\zeta) = \frac{d}{d\zeta}e^{\zeta} \tag{1082}$$

$$\frac{d}{d\zeta}\beta(\zeta) = e^{\zeta} \tag{1083}$$

$$\zeta + \beta(\zeta) = \zeta + \frac{d}{d\zeta}\beta(\zeta) \tag{1084}$$

$$\frac{d}{d\zeta}\beta(\zeta) = \beta(\zeta) \tag{1085}$$

$$\zeta + \frac{d}{d\zeta}\beta(\zeta) = \zeta + \frac{d^2}{d\zeta^2}\beta(\zeta) \tag{1086}$$

1.2.87 Derivation 86

$$\alpha(\iota) = \log{(\iota)} \tag{1087}$$

$$2\alpha(\iota) = \alpha(\iota) + \log{(\iota)} \tag{1088}$$

$$\frac{d}{d\iota}2\alpha(\iota) = \frac{d}{d\iota}(\alpha(\iota) + \log{(\iota)}) \tag{1089}$$

$$2\frac{d}{d\iota}\alpha(\iota) = \frac{d}{d\iota}\alpha(\iota) + \frac{1}{\iota} \tag{1090}$$

$$2\frac{d}{d\iota}\log{(\iota)} = \frac{d}{d\iota}\log{(\iota)} + \frac{1}{\iota} \tag{1091}$$

$$4(\frac{d}{d\iota}\log{(\iota)})^2 = (\frac{d}{d\iota}\log{(\iota)} + \frac{1}{\iota})^2 \tag{1092}$$

1.2.88 Derivation 87

$$o(\upsilon, \kappa) = \int(\kappa + \upsilon)d\kappa \tag{1093}$$

$$o(\upsilon, \kappa) = \frac{\kappa^2}{2} + \kappa\upsilon + \nu \tag{1094}$$

$$\int(\kappa + \upsilon)d\kappa = \frac{\kappa^2}{2} + \kappa\upsilon + \nu \tag{1095}$$

$$o(\upsilon, \kappa) + \int(\kappa + \upsilon)d\kappa = \frac{\kappa^2}{2} + \kappa\upsilon + \nu + o(\upsilon, \kappa) \tag{1096}$$

$$\frac{\kappa^2}{2} + \kappa\upsilon + \nu + \int(\kappa + \upsilon)d\kappa = \kappa^2 + 2\kappa\upsilon + 2\nu \tag{1097}$$

1.2.89 Derivation 88

$$\xi(\kappa) = \sin{(\kappa)} \tag{1098}$$

$$\iota(\kappa) = \frac{d}{d\kappa}\xi(\kappa) \tag{1099}$$

$$\iota^{\kappa}(\kappa) = (\frac{d}{d\kappa}\xi(\kappa))^{\kappa} \tag{1100}$$

$$\iota^{\kappa}(\kappa) = (\frac{d}{d\kappa}\sin{(\kappa)})^{\kappa} \tag{1101}$$

$$(\iota^{\kappa}(\kappa))^{\kappa} = ((\frac{d}{d\kappa}\sin{(\kappa)})^{\kappa})^{\kappa} \tag{1102}$$

$$(\iota^{\kappa}(\kappa))^{\kappa} = (\cos^{\kappa}{(\kappa)})^{\kappa} \tag{1103}$$

$$(\iota^{\kappa}(\kappa))^{\kappa} + (\frac{d}{d\kappa}\xi(\kappa))^{\kappa} = (\cos^{\kappa}{(\kappa)})^{\kappa} + (\frac{d}{d\kappa}\xi(\kappa))^{\kappa} \tag{1104}$$

1.2.90 Derivation 89

$$\nu(\zeta) = \sin{(\zeta)} \tag{1105}$$

$$\frac{d}{d\zeta}\nu(\zeta) = \frac{d}{d\zeta}\sin{(\zeta)} \tag{1106}$$

$$\frac{d}{d\zeta}\nu(\zeta) - \frac{d}{d\zeta}\sin{(\zeta)} = 0 \tag{1107}$$

$$-\cos{(\zeta)} + \frac{d}{d\zeta}\nu(\zeta) = 0 \tag{1108}$$

$$(-\cos{(\zeta)} + \frac{d}{d\zeta}\nu(\zeta))^{\zeta} = 0^{\zeta} \tag{1109}$$

$$\frac{(-\cos{(\zeta)} + \frac{d}{d\zeta}\nu(\zeta))^{\zeta}}{-\cos{(\zeta)} + \frac{d}{d\zeta}\sin{(\zeta)}} = \frac{0^{\zeta}}{-\cos{(\zeta)} + \frac{d}{d\zeta}\sin{(\zeta)}} \tag{1110}$$

1.2.91 Derivation 90

$$o(\tau) = e^{\tau} \tag{1111}$$

$$1 = \frac{e^{\tau}}{o(\tau)} \tag{1112}$$

$$\int 1 d\tau = \int \frac{e^{\tau}}{o(\tau)}d\tau \tag{1113}$$

$$\gamma + \tau = \int \frac{e^{\tau}}{o(\tau)}d\tau \tag{1114}$$

$$\gamma + \tau - \frac{1}{o(\tau)} = \int \frac{e^{\tau}}{o(\tau)} d\tau - \frac{1}{o(\tau)} \quad (1115)$$

$$\gamma + \tau + \frac{e^{\tau}}{o(\tau)} - \frac{1}{o(\tau)} = \int \frac{e^{\tau}}{o(\tau)} d\tau + \frac{e^{\tau}}{o(\tau)} - \frac{1}{o(\tau)} \quad (1116)$$

1.2.92 Derivation 91

$$\kappa(\nu) = \int \cos(\nu) d\nu \quad (1117)$$

$$\kappa(\nu) = \tau + \sin(\nu) \quad (1118)$$

$$\frac{\kappa(\nu)}{\tau} = \frac{\int \cos(\nu) d\nu}{\tau} \quad (1119)$$

$$\frac{\tau + \sin(\nu)}{\tau} = \frac{\int \cos(\nu) d\nu}{\tau} \quad (1120)$$

$$\upsilon(\nu, \tau) = -\tau - \sin(\nu) + \frac{\tau + \sin(\nu)}{\tau} \quad (1121)$$

$$\upsilon(\nu, \tau) = -\tau - \sin(\nu) + \frac{\int \cos(\nu) d\nu}{\tau} \quad (1122)$$

1.2.93 Derivation 92

$$\zeta(\beta) = \log(\beta) \quad (1123)$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{d}{d\beta}\log(\beta) \quad (1124)$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{1}{\beta} \quad (1125)$$

$$\tau\frac{d}{d\beta}\zeta(\beta) = \frac{\tau}{\beta} \quad (1126)$$

$$\tau\frac{d}{d\beta}\log(\beta) = \frac{\tau}{\beta} \quad (1127)$$

$$\int \tau\frac{d}{d\beta}\log(\beta) d\beta = \int \frac{\tau}{\beta} d\beta \quad (1128)$$

$$\iint \tau\frac{d}{d\beta}\log(\beta) d\beta d\beta = \iint \frac{\tau}{\beta} d\beta d\beta \quad (1129)$$

$$\frac{\iint \tau\frac{d}{d\beta}\log(\beta) d\beta d\beta}{\log(\beta)} = \frac{\iint \frac{\tau}{\beta} d\beta d\beta}{\log(\beta)} \quad (1130)$$

1.2.94 Derivation 93

$$\xi(\kappa, \nu) = \int (\kappa - \nu) d\nu \quad (1131)$$

$$\xi^{\nu}(\kappa, \nu) = (\int (\kappa - \nu) d\nu)^{\nu} \quad (1132)$$

$$\xi^{\nu}(\kappa, \nu) = (\kappa\nu - \frac{\nu^2}{2} + o)^{\nu} \quad (1133)$$

$$(\kappa\nu - \frac{\nu^2}{2} + o)^{\nu} = (\int (\kappa - \nu) d\nu)^{\nu} \quad (1134)$$

$$(\kappa\nu - \frac{\nu^2}{2} + o)^{\nu} = (\gamma + \kappa\nu - \frac{\nu^2}{2})^{\nu} \quad (1135)$$

$$\xi^{\nu}(\kappa, \nu) = (\gamma + \kappa\nu - \frac{\nu^2}{2})^{\nu} \quad (1136)$$

1.2.95 Derivation 94

$$\upsilon(\beta) = \sin(e^{\beta}) \quad (1137)$$

$$\gamma(\xi) = \sin(\xi) \quad (1138)$$

$$\frac{d}{d\xi}\gamma(\xi) = \frac{d}{d\xi}\sin(\xi) \quad (1139)$$

$$\frac{d}{d\beta}\upsilon(\beta) = \frac{d}{d\beta}\sin(e^{\beta}) \quad (1140)$$

$$\frac{d}{d\xi}\gamma(\xi) = \cos(\xi) \quad (1141)$$

$$\frac{d}{d\xi}\sin(\xi) = \cos(\xi) \quad (1142)$$

$$\frac{d}{d\beta}\upsilon(\beta) + \frac{d}{d\xi}\sin(\xi) = \frac{d}{d\xi}\sin(\xi) + \frac{d}{d\beta}\sin(e^{\beta}) \quad (1143)$$

$$\cos(\xi) + \frac{d}{d\beta}\upsilon(\beta) = \cos(\xi) + \frac{d}{d\beta}\sin(e^{\beta}) \quad (1144)$$

1.2.96 Derivation 95

$$o(\xi) = e^{\xi} \tag{1145}$$

$$\frac{d}{d\xi}o(\xi) = \frac{d}{d\xi}e^{\xi} \tag{1146}$$

$$2o(\xi) = o(\xi) + e^{\xi} \tag{1147}$$

$$\frac{d^2}{d\xi^2}o(\xi) = \frac{d^2}{d\xi^2}e^{\xi} \tag{1148}$$

$$\frac{d^2}{d\xi^2}o(\xi) = e^{\xi} \tag{1149}$$

$$2o(\xi) = o(\xi) + \frac{d^2}{d\xi^2}o(\xi) \tag{1150}$$

1.2.97 Derivation 96

$$\tau(\iota, \beta) = \frac{\beta}{\iota} \tag{1151}$$

$$\frac{\iota\tau(\iota, \beta)}{\beta} = 1 \tag{1152}$$

$$1 + \frac{\iota\tau(\iota, \beta)}{\beta} = 2 \tag{1153}$$

$$\frac{\partial}{\partial\beta}\tau(\iota, \beta) = \frac{\partial}{\partial\beta}\frac{\beta}{\iota} \tag{1154}$$

$$\frac{\partial}{\partial\beta}\tau(\iota, \beta) = \frac{1}{\iota} \tag{1155}$$

$$\frac{\frac{\partial}{\partial\beta}\tau(\iota, \beta)}{\iota} = \frac{1}{\iota^2} \tag{1156}$$

$$\frac{\frac{\partial}{\partial\beta}\tau(\iota, \beta)}{\iota} = \iota^{-1-\frac{\iota\tau(\iota,\beta)}{\beta}} \tag{1157}$$

1.2.98 Derivation 97

$$\alpha(\kappa) = e^{e^{\kappa}} \tag{1158}$$

$$\int \alpha(\kappa)d\kappa = \int e^{e^{\kappa}}d\kappa \tag{1159}$$

$$\int \alpha(\kappa)d\kappa = \nu + \operatorname{Ei}(e^{\kappa}) \tag{1160}$$

$$2\int \alpha(\kappa)d\kappa = \nu + \operatorname{Ei}(e^{\kappa}) + \int \alpha(\kappa)d\kappa \tag{1161}$$

$$\nu + \operatorname{Ei}(e^{\kappa}) = \int e^{e^{\kappa}}d\kappa \tag{1162}$$

$$2\int \alpha(\kappa)d\kappa = \int \alpha(\kappa)d\kappa + \int e^{e^{\kappa}}d\kappa \tag{1163}$$

$$2\int \alpha(\kappa)d\kappa = \iota + \operatorname{Ei}(e^{\kappa}) + \int \alpha(\kappa)d\kappa \tag{1164}$$

1.2.99 Derivation 98

$$\alpha(\kappa) = \log(\kappa) \tag{1165}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{d}{d\kappa}\log(\kappa) \tag{1166}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{1167}$$

$$\frac{d}{d\kappa}\log(\kappa) = \frac{1}{\kappa} \tag{1168}$$

$$(\frac{d}{d\kappa}\alpha(\kappa))^{-\kappa}\frac{d}{d\kappa}\log(\kappa) = \frac{(\frac{d}{d\kappa}\alpha(\kappa))^{-\kappa}}{\kappa} \tag{1169}$$

1.2.100 Derivation 99

$$\upsilon(\xi, \tau) = \tau + \xi \tag{1170}$$

$$\frac{\partial}{\partial\tau}\upsilon(\xi, \tau) = \frac{\partial}{\partial\tau}(\tau + \xi) \tag{1171}$$

$$\frac{\partial}{\partial\tau}\upsilon(\xi, \tau) = 1 \tag{1172}$$

$$(\tau + \xi)\frac{\partial}{\partial\tau}\upsilon(\xi, \tau) = \tau + \xi \tag{1173}$$

$$\zeta(\xi, \tau) = (\tau + \xi)\frac{\partial}{\partial\tau}\upsilon(\xi, \tau) \tag{1174}$$

$$\zeta(\xi, \tau) = (\tau + \xi)\frac{\partial}{\partial\tau}(\tau + \xi) \tag{1175}$$

$$\zeta(\xi, \tau) = (\tau + \xi)\frac{\partial}{\partial\tau}(\tau + \xi)\frac{\partial}{\partial\tau}\upsilon(\xi, \tau)\frac{\partial}{\partial\tau}\upsilon(\xi, \tau) \tag{1176}$$

1.3 Perturbation: EE

1.3.1 Derivation 0

$$e^a = \eta(a) \tag{1177}$$

$$\frac{d}{da}e^a = \frac{d}{da}\eta(a) \tag{1178}$$

$$e^a = \frac{d}{da}\eta(a) \tag{1179}$$

$$\eta(a) = \frac{d}{da}\eta(a) \tag{1180}$$

$$\eta^2(a) = \eta(a)\frac{d}{da}\eta(a) \tag{1181}$$

$$\frac{d^2}{da^2}\eta(a) = \frac{d}{da}\eta(a) \tag{1182}$$

$$\eta^2(a) = \eta(a)\frac{d^2}{da^2}\eta(a) \tag{1183}$$

1.3.2 Derivation 1

$$\frac{d}{d\mathbf{s}}\sin(\mathbf{s}) = \mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{1184}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{1185}$$

$$-\sin(\mathbf{s}) = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{1186}$$

$$-\sin(\mathbf{s}) = \frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) \tag{1187}$$

1.3.3 Derivation 2

$$e^{\Psi_\lambda} = \mathbb{I}(\Psi_\lambda) \tag{1188}$$

$$\int e^{\Psi_\lambda}d\Psi_\lambda = \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{1189}$$

$$\Psi_\lambda + \int e^{\Psi_\lambda}d\Psi_\lambda = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{1190}$$

$$\Psi_\lambda + \chi + e^{\Psi_\lambda} = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{1191}$$

$$\Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{1192}$$

1.3.4 Derivation 3

$$\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = m(\hat{x}_0, \mathbf{r}) \tag{1193}$$

$$\hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0 m(\hat{x}_0, \mathbf{r}) \tag{1194}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0 m(\hat{x}_0, \mathbf{r}) \tag{1195}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{1196}$$

1.3.5 Derivation 4

$$\sin(P_e) = \mathrm{V}_{\mathbf{B}}(P_e) \tag{1197}$$

$$\frac{d}{dP_e}\sin(P_e) = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) \tag{1198}$$

$$\cos(P_e) = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) \tag{1199}$$

$$\cos(P_e) = \frac{d}{dP_e}\sin(P_e) \tag{1200}$$

$$\frac{\cos(P_e)}{P_e} = \frac{\frac{d}{dP_e}\sin(P_e)}{P_e} \tag{1201}$$

$$-1 + \frac{\cos(P_e)}{P_e} = -1 + \frac{\frac{d}{dP_e}\sin(P_e)}{P_e} \tag{1202}$$

1.3.6 Derivation 5

$$\int(\mathbf{J} + \mathbf{v})d\mathbf{J} = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{1203}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{1204}$$

$$1 = \frac{\mathrm{F_c}(\mathbf{J}, \mathbf{v})}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} \tag{1205}$$

$$1 = \frac{\int(\mathbf{J} + \mathbf{v})d\mathbf{J}}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} \tag{1206}$$

1.3.7 Derivation 6

$$\cos(J) = \mathbf{M}(J) \tag{1207}$$

$$\int \cos(J)dJ = \int \mathbf{M}(J)dJ \tag{1208}$$

$$F_g + \sin(J) = \int \mathbf{M}(J)dJ \tag{1209}$$

$$\int \cos(J)dJ = F_g + \sin(J) \tag{1210}$$

$$(\int \cos(J)dJ)^{F_g} = (F_g + \sin(J))^{F_g} \tag{1211}$$

$$(F_g+\sin(J))^{F_g}+(\int \cos(J)dJ)^{F_g} = 2(F_g+\sin(J))^{F_g} \tag{1212}$$

$$\int ((F_g+\sin(J))^{F_g}+(\int \cos(J)dJ)^{F_g})dF_g = \int 2(F_g+\sin(J))^{F_g}dF_g \tag{1213}$$

1.3.8 Derivation 7

$$\sin(\mathbf{p}) = \mathrm{C_d}(\mathbf{p}) \tag{1214}$$

$$\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) = \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{1215}$$

$$F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) = F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{1216}$$

$$\int F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c = \int F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p})dF_c \tag{1217}$$

$$\cos(\mathbf{p}) = \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{1218}$$

$$\int F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c = \int F_c\cos(\mathbf{p})dF_c \tag{1219}$$

1.3.9 Derivation 8

$$-\sigma_x + \varphi = \mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi) \tag{1220}$$

$$\frac{\partial}{\partial\varphi}(-\sigma_x + \varphi) = \frac{\partial}{\partial\varphi}\mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi) \tag{1221}$$

$$\frac{\partial^2}{\partial\varphi^2}(-\sigma_x + \varphi) = \frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi) \tag{1222}$$

$$0 = \frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi) \tag{1223}$$

$$1 = e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi)} \tag{1224}$$

$$1 = (e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}(\sigma_x, \varphi)})^{\sigma_x} \tag{1225}$$

1.3.10 Derivation 9

$$\frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) = \hat{p}_0(\phi, \mathbf{H}) \tag{1226}$$

$$1 = \hat{p}_0(\phi, \mathbf{H}) \tag{1227}$$

$$\frac{d}{d\phi}1 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) \tag{1228}$$

$$\frac{d}{d\phi}1 = \frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) \tag{1229}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) \tag{1230}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{1231}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) = 0 \tag{1232}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 \tag{1233}$$

1.3.11 Derivation 10

$$\cos(q) = \theta(q) \tag{1234}$$

$$\frac{d}{dq}\cos(q) = \frac{d}{dq}\theta(q) \tag{1235}$$

$$-\sin(q) = \frac{d}{dq}\theta(q) \tag{1236}$$

$$\frac{d}{dq}\cos(q) = -\sin(q) \tag{1237}$$

$$(\frac{d}{dq}\cos(q))^q = (-\sin(q))^q \tag{1238}$$

$$(-\sin(q))^q(\frac{d}{dq}\cos(q))^q = (-\sin(q))^{2q} \tag{1239}$$

1.3.12 Derivation 11

$$\frac{\partial}{\partial g}(\lambda + g) = \mathrm{r}_0(\lambda, g) \tag{1240}$$

$$\frac{\partial^2}{\partial g^2}(\lambda + g) = \frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) \tag{1241}$$

$$0 = \frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) \tag{1242}$$

$$\frac{d}{d\lambda}0 = \frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) \tag{1243}$$

$$(\lambda + g)\frac{d}{d\lambda}0 = (\lambda + g)\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) \tag{1244}$$

1.3.13 Derivation 12

$$\log(\mathbf{g}) = \mathbf{B}(\mathbf{g}) \tag{1245}$$

$$\frac{d}{d\mathbf{g}}\log(\mathbf{g}) = \frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) \tag{1246}$$

$$\frac{1}{\mathbf{g}} = \frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) \tag{1247}$$

$$\cos(\frac{1}{\mathbf{g}}) = \cos(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})) \tag{1248}$$

$$\cos(\frac{1}{\mathbf{g}}) = \cos(\frac{d}{d\mathbf{g}}\log(\mathbf{g})) \tag{1249}$$

1.3.14 Derivation 13

$$\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} = \mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) \tag{1250}$$

$$\mathbf{P}\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) \tag{1251}$$

$$Q\mathbf{P} = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) \tag{1252}$$

$$Q\mathbf{P} - \cos(\sin(J)) = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J)) \tag{1253}$$

$$\frac{Q\mathbf{P} - \cos(\sin(J))}{J} = \frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J))}{J} \tag{1254}$$

1.3.15 Derivation 14

$$\cos(u) = \mathrm{a}^{\dagger}(u) \tag{1255}$$

$$\frac{d}{du}\cos(u) = \frac{d}{du}\mathrm{a}^{\dagger}(u) \tag{1256}$$

$$(\frac{d}{du}\cos(u))^u = (\frac{d}{du}\mathrm{a}^{\dagger}(u))^u \tag{1257}$$

$$(-\sin(u))^u = (\frac{d}{du}\mathrm{a}^{\dagger}(u))^u \tag{1258}$$

$$(-\sin(u))^u = (\frac{d}{du}\cos(u))^u \tag{1259}$$

$$\frac{d}{du}(-\sin(u))^u = \frac{d}{du}(\frac{d}{du}\cos(u))^u \tag{1260}$$

1.3.16 Derivation 15

$$\log(\mathbf{B}^{\hat{H}}) = \mathrm{A}_2(\hat{H}, \mathbf{B}) \tag{1261}$$

$$\cos(y) = \hat{H}_\lambda(y) \tag{1262}$$

$$\frac{\cos(y)}{\frac{\partial}{\partial\hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} = \frac{\hat{H}_\lambda(y)}{\frac{\partial}{\partial\hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} \tag{1263}$$

$$\frac{\cos(y)}{\frac{\partial}{\partial\hat{H}}\log(\mathbf{B}^{\hat{H}})} = \frac{\hat{H}_\lambda(y)}{\frac{\partial}{\partial\hat{H}}\log(\mathbf{B}^{\hat{H}})} \tag{1264}$$

$$\frac{\cos(y)}{\log(\mathbf{B})} = \frac{\hat{H}_\lambda(y)}{\log(\mathbf{B})} \tag{1265}$$

$$(\frac{\cos(y)}{\log(\mathbf{B})})^y = (\frac{\hat{H}_\lambda(y)}{\log(\mathbf{B})})^y \tag{1266}$$

1.3.17 Derivation 16

$$C_d = f(C_d) \tag{1267}$$

$$\frac{d}{dC_d}C_d = \frac{d}{dC_d}f(C_d) \tag{1268}$$

$$1 = \frac{d}{dC_d}f(C_d) \tag{1269}$$

$$\frac{1}{\frac{d}{dC_d}f(C_d)} = 1 \tag{1270}$$

$$\frac{1}{\frac{d}{dC_d}C_d} = 1 \tag{1271}$$

$$\frac{1}{\frac{d}{df(C_d)}f(C_d)} = 1 \tag{1272}$$

1.3.18 Derivation 17

$$\cos(f') = \hat{X}(f') \tag{1273}$$

$$\frac{d}{df'}\cos(f') = \frac{d}{df'}\hat{X}(f') \tag{1274}$$

$$\frac{d^2}{d(f')^2}\cos(f') = \frac{d^2}{d(f')^2}\hat{X}(f') \tag{1275}$$

$$-\cos(f') = \frac{d^2}{d(f')^2}\hat{X}(f') \tag{1276}$$

$$-\frac{\cos(f')}{\mathrm{P_e}(f')} = \frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}(f')} \tag{1277}$$

1.3.19 Derivation 18

$$\log(P_e) = W(P_e) \tag{1278}$$

$$\frac{d}{dP_e}\log(P_e) = \frac{d}{dP_e}W(P_e) \tag{1279}$$

$$\frac{1}{P_e} = \frac{d}{dP_e}W(P_e) \tag{1280}$$

$$\frac{1}{P_e} = \frac{d}{dP_e}\log(P_e) \tag{1281}$$

$$\int \frac{1}{P_e}dP_e = \int \frac{d}{dP_e}\log(P_e)dP_e \tag{1282}$$

1.3.20 Derivation 19

$$\int e^{\hat{H}_l}d\hat{H}_l = \mathrm{E}_\lambda(\hat{H}_l) \tag{1283}$$

$$-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l = 0 \tag{1284}$$

$$(-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l)\int e^{\hat{H}_l}d\hat{H}_l = 0 \tag{1285}$$

$$((-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l)^2)\int e^{\hat{H}_l}d\hat{H}_l = 0 \tag{1286}$$

$$(A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 = 0 \tag{1287}$$

$$(A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 = 0 \tag{1288}$$

1.3.21 Derivation 20

$$\cos(V_\mathbf{B} + \mu_0) = \mathrm{n}_2(V_\mathbf{B}, \mu_0) \tag{1289}$$

$$\int \cos(V_\mathbf{B} + \mu_0)d\mu_0 = \int \mathrm{n}_2(V_\mathbf{B}, \mu_0)d\mu_0 \tag{1290}$$

$$C_2 + \sin(V_\mathbf{B} + \mu_0) = \int \mathrm{n}_2(V_\mathbf{B}, \mu_0)d\mu_0 \tag{1291}$$

$$C_2 + \sin(V_\mathbf{B} + \mu_0) = \int \cos(V_\mathbf{B} + \mu_0)d\mu_0 \tag{1292}$$

1.3.22 Derivation 21

$$\int e^S dS = \mathrm{E_n}(S) \tag{1293}$$

$$x + e^S = \mathrm{E_n}(S) \tag{1294}$$

$$\int e^S dS = x + e^S \tag{1295}$$

$$T + e^S = x + e^S \tag{1296}$$

$$\int (T + e^S)dT = \int (x + e^S)dT \tag{1297}$$

$$\int (T + e^S)dT = \int \mathrm{E_n}(S)dT \quad (1298)$$

$$\frac{T^2}{2} + Te^S + \psi^* = \int \mathrm{E_n}(S)dT \quad (1299)$$

$$\int (T + e^S)dT = \frac{T^2}{2} + Te^S + \psi^* \quad (1300)$$

$$\frac{T^2}{2} + Te^S + t_2 = \frac{T^2}{2} + Te^S + \psi^* \quad (1301)$$

1.3.23 Derivation 22

$$\frac{\partial}{\partial \rho} Z\rho = \mathrm{A_x}(Z, \rho) \quad (1302)$$

$$Z = \mathrm{A_x}(Z, \rho) \quad (1303)$$

$$Z + \frac{\partial}{\partial \rho} Z\rho = Z + \mathrm{A_x}(Z, \rho) \quad (1304)$$

$$Z + \rho + \frac{\partial}{\partial \rho} Z\rho = Z + \rho + \mathrm{A_x}(Z, \rho) \quad (1305)$$

$$\int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho = \int (Z + \rho + \mathrm{A_x}(Z, \rho))d\rho \quad (1306)$$

$$\int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho = \int (2Z + \rho)d\rho \quad (1307)$$

$$\frac{\partial}{\partial Z} \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho = \frac{\partial}{\partial Z} \int (2Z + \rho)d\rho \quad (1308)$$

1.3.24 Derivation 23

$$\cos(e^\phi) = \mathbf{p}(\phi) \quad (1309)$$

$$\int \cos(e^\phi)d\phi = \int \mathbf{p}(\phi)d\phi \quad (1310)$$

$$\iint \cos(e^\phi)d\phi d\phi = \iint \mathbf{p}(\phi)d\phi d\phi \quad (1311)$$

$$\omega + \mathrm{Ci}(e^\phi) = \int \mathbf{p}(\phi)d\phi \quad (1312)$$

$$\omega + \mathrm{Ci}(e^\phi) = \int \cos(e^\phi)d\phi \quad (1313)$$

$$\int (\omega + \mathrm{Ci}(e^\phi))d\phi = \iint \cos(e^\phi)d\phi d\phi \quad (1314)$$

$$\frac{d}{d\phi} \iint \cos(e^\phi)d\phi d\phi = \frac{d}{d\phi} \iint \mathbf{p}(\phi)d\phi d\phi \quad (1315)$$

$$\frac{\partial}{\partial \phi} \int (\omega + \mathrm{Ci}(e^\phi))d\phi = \frac{d}{d\phi} \iint \mathbf{p}(\phi)d\phi d\phi \quad (1316)$$

1.3.25 Derivation 24

$$\frac{1}{A_x} = y(A_x) \quad (1317)$$

$$\int \frac{1}{A_x} dA_x = \int y(A_x)dA_x \quad (1318)$$

$$\varepsilon_0 + \log(A_x) = \int y(A_x)dA_x \quad (1319)$$

$$\varepsilon_0 + \log(A_x) = \int \frac{1}{A_x} dA_x \quad (1320)$$

$$\varepsilon_0 + \log(A_x) - \frac{x}{A_x} = \int \frac{1}{A_x} dA_x - \frac{x}{A_x} \quad (1321)$$

$$\frac{\partial}{\partial x}(\varepsilon_0 + \log(A_x) - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\int \frac{1}{A_x} dA_x - \frac{x}{A_x}) \quad (1322)$$

1.3.26 Derivation 25

$$e^g = \theta_1(g) \quad (1323)$$

$$\int e^g dg = \int \theta_1(g)dg \quad (1324)$$

$$(\int e^g dg)^g = (\int \theta_1(g)dg)^g \quad (1325)$$

$$\frac{d}{dg}(\int e^g dg)^g = \frac{d}{dg}(\int \theta_1(g)dg)^g \quad (1326)$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{d}{dg}(\int \theta_1(g)dg)^g \quad (1327)$$

$$\frac{d}{dg}(\int e^g dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \quad (1328)$$

$$\frac{d}{dg}(\int e^g dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g \quad (1329)$$

1.3.27 Derivation 26

$$\cos(P_e) = \chi(P_e) \tag{1330}$$

$$\int \cos(P_e)dP_e = \int \chi(P_e)dP_e \tag{1331}$$

$$\frac{d}{dP_e}\int \cos(P_e)dP_e = \frac{d}{dP_e}\int \chi(P_e)dP_e \tag{1332}$$

$$\frac{\partial}{\partial P_e}(\psi + \sin(P_e)) = \frac{d}{dP_e}\int \chi(P_e)dP_e \tag{1333}$$

$$\frac{d}{dP_e}\int \cos(P_e)dP_e = \frac{\partial}{\partial P_e}(\psi + \sin(P_e)) \tag{1334}$$

1.3.28 Derivation 27

$$\int \log(x')dx' = \phi(x') \tag{1335}$$

$$\frac{d}{dx'}\int \log(x')dx' = \frac{d}{dx'}\phi(x') \tag{1336}$$

$$\frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') = \frac{d}{dx'}\phi(x') \tag{1337}$$

$$\frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') = \mathrm{t}_1(x', n_2) \tag{1338}$$

$$\frac{d}{dx'}\phi(x') = \mathrm{t}_1(x', n_2) \tag{1339}$$

$$e^{-\frac{d}{dx'}\phi(x')}\frac{d}{dx'}\phi(x') = \mathrm{t}_1(x', n_2)e^{-\frac{d}{dx'}\phi(x')} \tag{1340}$$

1.3.29 Derivation 28

$$e^{t_1} = f(t_1) \tag{1341}$$

$$\frac{d}{dt_1}e^{t_1} = \frac{d}{dt_1}f(t_1) \tag{1342}$$

$$e^{t_1} = \frac{d}{dt_1}f(t_1) \tag{1343}$$

$$\frac{d^2}{dt_1^2}f(t_1) = \frac{d}{dt_1}f(t_1) \tag{1344}$$

$$(\frac{d^2}{dt_1^2}f(t_1))^2 = (\frac{d}{dt_1}f(t_1))^2 \tag{1345}$$

$$(\frac{d^2}{dt_1^2}f(t_1))^4 = (\frac{d}{dt_1}f(t_1))^4 \tag{1346}$$

1.3.30 Derivation 29

$$e^{c_0} = q(c_0) \tag{1347}$$

$$\int e^{c_0}dc_0 = \int q(c_0)dc_0 \tag{1348}$$

$$e^{-c_0}\int e^{c_0}dc_0 = e^{-c_0}\int q(c_0)dc_0 \tag{1349}$$

$$(n + e^{c_0})e^{-c_0} = e^{-c_0}\int q(c_0)dc_0 \tag{1350}$$

$$\frac{n + q(c_0)}{q(c_0)} = \frac{\int q(c_0)dc_0}{q(c_0)} \tag{1351}$$

1.3.31 Derivation 30

$$\frac{\partial}{\partial A_x}(-A_x + i) = b(A_x, i) \tag{1352}$$

$$(\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} = b^{A_x}(A_x, i) \tag{1353}$$

$$0 = b^{A_x}(A_x, i) - (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} \tag{1354}$$

$$0 = -(-1)^{A_x} + b^{A_x}(A_x, i) \tag{1355}$$

$$0 = \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} \tag{1356}$$

$$\int 0di = \int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i}di \tag{1357}$$

1.3.32 Derivation 31

$$\int \log(\mathbf{P})d\mathbf{P} = A(\mathbf{P}) \tag{1358}$$

$$\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 = A(\mathbf{P}) \tag{1359}$$

$$\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 = \int \log(\mathbf{P})d\mathbf{P} \tag{1360}$$

$$(\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} = (\int \log(\mathbf{P})d\mathbf{P})^{\theta_1} \tag{1361}$$

$$A^{\theta_1}(\mathbf{P}) = (\int \log(\mathbf{P}) d\mathbf{P})^{\theta_1} \quad (1362)$$

$$(\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} = A^{\theta_1}(\mathbf{P}) \quad (1363)$$

$$\frac{\partial}{\partial\theta_1}(\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} = \frac{\partial}{\partial\theta_1}A^{\theta_1}(\mathbf{P}) \quad (1364)$$

1.3.33 Derivation 32

$$\sin(\dot{z}) = \mathrm{P_e}(\dot{z}) \quad (1365)$$

$$\frac{d}{d\dot{z}}\sin(\dot{z}) = \frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \quad (1366)$$

$$\cos(\dot{z}) = \frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \quad (1367)$$

$$\sin(\dot{z})\cos(\dot{z}) = \sin(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \quad (1368)$$

$$\mathrm{P_e}(\dot{z})\cos(\dot{z}) = \mathrm{P_e}(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \quad (1369)$$

1.3.34 Derivation 33

$$\sin(e^{\mathbf{A}}) = \mathbf{J}(\mathbf{A}) \quad (1370)$$

$$\frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}}) = \frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) \quad (1371)$$

$$e^{\mathbf{A}}\cos(e^{\mathbf{A}}) = \frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) \quad (1372)$$

$$e^{\mathbf{A}}\cos(e^{\mathbf{A}}) = \frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}}) \quad (1373)$$

$$\cos(e^{\mathbf{A}}) = e^{-\mathbf{A}}\frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}}) \quad (1374)$$

1.3.35 Derivation 34

$$\frac{\mathbf{f}\varepsilon}{v_1} = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (1375)$$

$$\frac{\partial}{\partial\mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (1376)$$

$$\frac{\varepsilon}{v_1} = \frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (1377)$$

$$\mathbf{f}\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (1378)$$

1.3.36 Derivation 35

$$V = \lambda(V) \quad (1379)$$

$$\frac{V}{\lambda(V)} = 1 \quad (1380)$$

$$\frac{d}{dV}\frac{V}{\lambda(V)} = \frac{d}{dV}1 \quad (1381)$$

$$0 = \frac{d}{dV}1 - \frac{d}{dV}\frac{V}{\lambda(V)} \quad (1382)$$

$$0 = \frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} \quad (1383)$$

$$0 = \frac{\frac{d}{dV}V}{V} - \frac{1}{V} \quad (1384)$$

$$0 = \frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} \quad (1385)$$

1.3.37 Derivation 36

$$A + V - \dot{z} = \mathrm{f}'(\dot{z}, V, A) \quad (1386)$$

$$\int (A + V - \dot{z})dV = \int \mathrm{f}'(\dot{z}, V, A)dV \quad (1387)$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int \mathrm{f}'(\dot{z}, V, A)dV \quad (1388)$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int (A + V - \dot{z})dV \quad (1389)$$

1.3.38 Derivation 37

$$e^{\mathbf{S}} = \mathrm{A_x}(\mathbf{S}) \quad (1390)$$

$$2e^{\mathbf{S}} = \mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}} \quad (1391)$$

$$\frac{d}{d\mathbf{S}}2e^{\mathbf{S}} = \frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) \quad (1392)$$

$$2e^{\mathbf{S}} = e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) \quad (1393)$$

$$\frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S})) = \frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) \quad (1394)$$

1.3.39 Derivation 38

$$\sin(\phi_1) = J(\phi_1) \tag{1395}$$

$$\frac{d}{d\phi_1}\sin(\phi_1) = \frac{d}{d\phi_1}J(\phi_1) \tag{1396}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{1397}$$

$$\sin(\phi_1)\cos(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{1398}$$

$$\sin(\phi_1)\cos(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) \tag{1399}$$

$$J(\phi_1)\cos(\phi_1) = J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{1400}$$

1.3.40 Derivation 39

$$\mathbf{A} + \varepsilon_0 = M(\mathbf{A}, \varepsilon_0) \tag{1401}$$

$$\int(\mathbf{A} + \varepsilon_0)d\mathbf{A} = \int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} \tag{1402}$$

$$(\int(\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{1403}$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{1404}$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int(\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{1405}$$

1.3.41 Derivation 40

$$\frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} = \hat{p}(k, \hat{H}_\lambda) \tag{1406}$$

$$0 = \hat{p}(k, \hat{H}_\lambda) - \frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} \tag{1407}$$

$$\frac{1}{k} = \hat{p}(k, \hat{H}_\lambda) \tag{1408}$$

$$0 = -\frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} + \frac{1}{k} \tag{1409}$$

1.3.42 Derivation 41

$$e^{e^\pi} = \mathrm{F_x}(\pi) \tag{1410}$$

$$\int e^{e^\pi}d\pi = \int \mathrm{F_x}(\pi)d\pi \tag{1411}$$

$$P_g + \mathrm{Ei}(e^\pi) = \int \mathrm{F_x}(\pi)d\pi \tag{1412}$$

$$-\int \mathrm{F_x}(\pi)d\pi + \int e^{e^\pi}d\pi = 0 \tag{1413}$$

$$F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi)d\pi = 0 \tag{1414}$$

$$F_g - P_g = 0 \tag{1415}$$

1.3.43 Derivation 42

$$c\cos(\lambda) = \dot{\mathbf{r}}(\lambda, c) \tag{1416}$$

$$\frac{\partial}{\partial c}c\cos(\lambda) = \frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c) \tag{1417}$$

$$(\frac{\partial}{\partial c}c\cos(\lambda))^\lambda = (\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^\lambda \tag{1418}$$

$$\cos^\lambda(\lambda) = (\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^\lambda \tag{1419}$$

$$(\frac{\partial}{\partial c}c\cos(\lambda))^\lambda = \cos^\lambda(\lambda) \tag{1420}$$

1.3.44 Derivation 43

$$\cos(\nabla) = G(\nabla) \tag{1421}$$

$$\cos(\nabla) + \int\cos(\nabla)d\nabla = G(\nabla) + \int\cos(\nabla)d\nabla \tag{1422}$$

$$\varphi + \sin(\nabla) + \cos(\nabla) = \varphi + G(\nabla) + \sin(\nabla) \tag{1423}$$

$$\int(\varphi + \sin(\nabla) + \cos(\nabla))d\nabla = \int(\varphi + G(\nabla) + \sin(\nabla))d\nabla \tag{1424}$$

$$-G(\nabla) + \int(\varphi + \sin(\nabla) + \cos(\nabla))d\nabla - \int\cos(\nabla)d\nabla = -G(\nabla) \tag{1425}$$

1.3.45 Derivation 44

$$\frac{\partial}{\partial f^*}(\pi + f^*) = \nabla(f^*, \pi) \tag{1426}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) = f^* \nabla(f^*, \pi) \tag{1427}$$

$$f^* = f^* \nabla(f^*, \pi) \tag{1428}$$

$$(f^*)^{f^*} = (f^* \nabla(f^*, \pi))^{f^*} \tag{1429}$$

$$f^* \nabla(f^*, \pi) + (f^*)^{f^*} = f^* \nabla(f^*, \pi) + (f^* \nabla(f^*, \pi))^{f^*} \tag{1430}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} = f^* \frac{\partial}{\partial f^*}(\pi + f^*) + (f^* \frac{\partial}{\partial f^*}(\pi + f^*))^{f^*} \tag{1431}$$

1.3.46 Derivation 45

$$\frac{F_x}{\mathbf{r}} = \eta'(\mathbf{r}, F_x) \tag{1432}$$

$$\frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} = \frac{\partial}{\partial \mathbf{r}} \eta'(\mathbf{r}, F_x) \tag{1433}$$

$$-\frac{F_x}{\mathbf{r}^2} = \frac{\partial}{\partial \mathbf{r}} \eta'(\mathbf{r}, F_x) \tag{1434}$$

$$-\frac{F_x}{\mathbf{r}^2} = \frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} \tag{1435}$$

$$-F_x - \frac{F_x}{\mathbf{r}^2} = -F_x + \frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} \tag{1436}$$

1.3.47 Derivation 46

$$\sin(\lambda) = u(\lambda) \tag{1437}$$

$$\int \sin(\lambda) d\lambda = \int u(\lambda) d\lambda \tag{1438}$$

$$n - \cos(\lambda) = \int u(\lambda) d\lambda \tag{1439}$$

$$n - \cos(\lambda) = \int \sin(\lambda) d\lambda \tag{1440}$$

$$-\frac{n - \cos(\lambda)}{\cos(\lambda)} = -\frac{\int \sin(\lambda) d\lambda}{\cos(\lambda)} \tag{1441}$$

1.3.48 Derivation 47

$$\phi_1 = \mathrm{f}'(\phi_1) \tag{1442}$$

$$\phi_1^2 = \phi_1 \mathrm{f}'(\phi_1) \tag{1443}$$

$$\int \phi_1^2 d\phi_1 = \int \phi_1 \mathrm{f}'(\phi_1) d\phi_1 \tag{1444}$$

$$\hbar + \frac{\phi_1^3}{3} = \int \phi_1 \mathrm{f}'(\phi_1) d\phi_1 \tag{1445}$$

$$\hbar + \frac{\phi_1^3}{3} = \int \phi_1^2 d\phi_1 \tag{1446}$$

$$\hbar + \frac{\phi_1^3}{3} = \frac{\phi_1^3}{3} + n_2 \tag{1447}$$

1.3.49 Derivation 48

$$\int \log(\omega) d\omega = \mathrm{a}^\dagger(\omega) \tag{1448}$$

$$\omega \log(\omega) - \omega + \rho = \mathrm{a}^\dagger(\omega) \tag{1449}$$

$$\omega \log(\omega) - \omega = -\rho + \mathrm{a}^\dagger(\omega) \tag{1450}$$

$$(\omega \log(\omega) - \omega)^\omega = (-\rho + \mathrm{a}^\dagger(\omega))^\omega \tag{1451}$$

$$\frac{d}{d\rho}(\omega \log(\omega) - \omega)^\omega = \frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^\dagger(\omega))^\omega \tag{1452}$$

1.3.50 Derivation 49

$$\int \log(f) df = \hat{x}(f) \tag{1453}$$

$$B + f \log(f) - f = \hat{x}(f) \tag{1454}$$

$$\int \log(f) df = B + f \log(f) - f \tag{1455}$$

$$f + \int \log(f) df = B + f \log(f) \tag{1456}$$

1.3.51 Derivation 50

$$C_2 = \mathbf{v}(C_2) \tag{1457}$$

$$\int C_2 dC_2 = \int \mathbf{v}(C_2) dC_2 \tag{1458}$$

$$\frac{C_2^2}{2} + v = \int \mathbf{v}(C_2) dC_2 \tag{1459}$$

$$v + \frac{\mathbf{v}^2(C_2)}{2} = \int \mathbf{v}(C_2) d\mathbf{v}(C_2) \tag{1460}$$

$$v + \frac{\mathbf{v}^2(C_2)}{2} = \mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} \tag{1461}$$

$$\frac{C_2^2}{2} + v = \frac{C_2^2}{2} + \mathbf{p} \tag{1462}$$

1.3.52 Derivation 51

$$\log(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) \tag{1463}$$

$$\int \log(\mathbf{s}) d\mathbf{s} = \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{1464}$$

$$\mathbf{s}\log(\mathbf{s}) - \mathbf{s} + \omega = \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{1465}$$

$$\mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = a(\mathbf{s}) \tag{1466}$$

$$-\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) = a(\mathbf{s}) \tag{1467}$$

1.3.53 Derivation 52

$$\hat{X}^t = \mathrm{v_t}(t, \hat{X}) \tag{1468}$$

$$\frac{\partial}{\partial t}\hat{X}^t = \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) \tag{1469}$$

$$\hat{X} + \frac{\partial}{\partial t}\hat{X}^t = \hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) \tag{1470}$$

$$\hat{X} + \hat{X}^t \log(\hat{X}) = \hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) \tag{1471}$$

$$\hat{X} + \mathrm{v_t}(t, \hat{X}) \log(\hat{X}) = \hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) \tag{1472}$$

$$\hat{X} + \hat{X}^t \log(\hat{X}) = \hat{X} + \frac{\partial}{\partial t}\hat{X}^t \tag{1473}$$

1.3.54 Derivation 53

$$e^A = \mathrm{A_y}(A) \tag{1474}$$

$$\frac{d}{dA}e^A = \frac{d}{dA}\mathrm{A_y}(A) \tag{1475}$$

$$(\frac{d}{dA}e^A)^A = (\frac{d}{dA}\mathrm{A_y}(A))^A \tag{1476}$$

$$(e^A)^A = (\frac{d}{dA}\mathrm{A_y}(A))^A \tag{1477}$$

$$(e^A)^A = (\frac{d}{dA}e^A)^A \tag{1478}$$

$$\mathrm{A_y}^A(A) = (\frac{d}{dA}\mathrm{A_y}(A))^A \tag{1479}$$

1.3.55 Derivation 54

$$\frac{r_0}{\mathbf{P}} = E(r_0, \mathbf{P}) \tag{1480}$$

$$\frac{r_0}{\mathbf{P}^2} = \frac{E(r_0, \mathbf{P})}{\mathbf{P}} \tag{1481}$$

$$\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}^2} = \frac{\partial}{\partial \mathbf{P}}\frac{E(r_0, \mathbf{P})}{\mathbf{P}} \tag{1482}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{1483}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} \tag{1484}$$

1.3.56 Derivation 55

$$\log(C_d) = x(C_d) \tag{1485}$$

$$\log(C_d)^{C_d} = x^{C_d}(C_d) \tag{1486}$$

$$\frac{d}{dC_d}\log(C_d)^{C_d} = \frac{d}{dC_d}x^{C_d}(C_d) \tag{1487}$$

$$(\log(\log(C_d)) + \frac{1}{\log(C_d)})\log(C_d)^{C_d} = (\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log(x(C \tag{1488}$$

$$(\log(\log(C_d)) + \frac{1}{\log(C_d)})\log(C_d)^{C_d} = (\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log(x(C \tag{1489}$$

1.3.57 Derivation 56

$$\sin{(\psi^*)} = C(\psi^*) \tag{1490}$$

$$\frac{d}{d\psi^*}\sin{(\psi^*)} = \frac{d}{d\psi^*}C(\psi^*) \tag{1491}$$

$$\cos{(\psi^*)} = \frac{d}{d\psi^*}C(\psi^*) \tag{1492}$$

$$\sin{(\psi^*)} + \frac{d}{d\psi^*}\sin{(\psi^*)} = C(\psi^*) + \frac{d}{d\psi^*}\sin{(\psi^*)} \tag{1493}$$

$$\sin{(\psi^*)} + \frac{d}{d\psi^*}C(\psi^*) = C(\psi^*) + \frac{d}{d\psi^*}C(\psi^*) \tag{1494}$$

$$\sin{(\psi^*)} + \cos{(\psi^*)} = C(\psi^*) + \cos{(\psi^*)} \tag{1495}$$

1.3.58 Derivation 57

$$\frac{C_2 f_{\mathbf{p}}}{y} = \phi(C_2, y, f_{\mathbf{p}}) \tag{1496}$$

$$\frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} = \frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{1497}$$

$$\frac{C_2 f_{\mathbf{p}}}{y} = \hat{x}_0(C_2, y, f_{\mathbf{p}}) \tag{1498}$$

$$\frac{f_{\mathbf{p}}}{y} = \frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{1499}$$

$$C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \hat{x}_0(C_2, y, f_{\mathbf{p}}) \tag{1500}$$

1.3.59 Derivation 58

$$\frac{1}{t_2} = \mathrm{E_x}\,(t_2) \tag{1501}$$

$$\int \frac{1}{t_2}dt_2 = \int \mathrm{E_x}\,(t_2)dt_2 \tag{1502}$$

$$(\int \frac{1}{t_2}dt_2)^{t_2} = (\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{1503}$$

$$C_1 + \log{(t_2)} = \int \mathrm{E_x}\,(t_2)dt_2 \tag{1504}$$

$$(\int \frac{1}{t_2}dt_2)^{t_2} = (C_1 + \log{(t_2)})^{t_2} \tag{1505}$$

$$(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} = (C_1 + \log{(t_2)})^{t_2} \tag{1506}$$

1.3.60 Derivation 59

$$\log{(\psi^*)} = \mathrm{M_E}\,(\psi^*) \tag{1507}$$

$$\frac{d}{d\psi^*}\log{(\psi^*)} = \frac{d}{d\psi^*}\mathrm{M_E}\,(\psi^*) \tag{1508}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\mathrm{M_E}\,(\psi^*) \tag{1509}$$

$$\frac{d}{d\psi^*}\log{(\psi^*)} = \frac{1}{\psi^*} \tag{1510}$$

$$(\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*} = (\frac{1}{\psi^*})^{\psi^*} \tag{1511}$$

$$((\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*})^{\psi^*} = ((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} \tag{1512}$$

$$(((\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} \tag{1513}$$

1.3.61 Derivation 60

$$e^u = H(u) \tag{1514}$$

$$\frac{e^u}{H(u)} = 1 \tag{1515}$$

$$\int \frac{e^u}{H(u)}du = \int 1du \tag{1516}$$

$$\int \frac{e^u}{H(u)}du = A_x + u \tag{1517}$$

$$-\int \frac{e^u}{H(u)}du = -A_x - u \tag{1518}$$

1.3.62 Derivation 61

$$\frac{\partial}{\partial s}(\mathbf{M} + s) = q(\mathbf{M}, s) \tag{1519}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = \frac{\partial}{\partial s}q(\mathbf{M}, s) \tag{1520}$$

$$0 = \frac{\partial}{\partial s}q(\mathbf{M}, s) \tag{1521}$$

$$0 = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{1522}$$

1.3.63 Derivation 62

$$-J_\varepsilon + \dot{y} = \tilde{g}(\dot{y}, J_\varepsilon) \tag{1523}$$

$$\frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) = \frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) \tag{1524}$$

$$-1 = \frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) \tag{1525}$$

$$\frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) = -1 \tag{1526}$$

$$\int \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y})dJ_\varepsilon = \int (-1)dJ_\varepsilon \tag{1527}$$

1.3.64 Derivation 63

$$\log\left(\chi^W\right) = \mathrm{A_x}\left(W, \chi\right) \tag{1528}$$

$$\int \log\left(\chi^W\right)dW = \int \mathrm{A_x}\left(W, \chi\right)dW \tag{1529}$$

$$M + \frac{W^2\log\left(\chi\right)}{2} = \int \mathrm{A_x}\left(W, \chi\right)dW \tag{1530}$$

$$M + \frac{W^2\log\left(\chi\right)}{2} = \int \log\left(\chi^W\right)dW \tag{1531}$$

$$M + \frac{W^2\log\left(\chi\right)}{2} - (e^\chi)^\chi = -(e^\chi)^\chi + \int \log\left(\chi^W\right)dW \tag{1532}$$

1.3.65 Derivation 64

$$\log\left(q\right) = \delta(q) \tag{1533}$$

$$\int \log\left(q\right)dq = \int \delta(q)dq \tag{1534}$$

$$-\int \delta(q)dq + \int \log\left(q\right)dq = 0 \tag{1535}$$

$$A_2 + q\log\left(q\right) - q - \int \delta(q)dq = 0 \tag{1536}$$

$$A_2 + q\delta(q) - q - \int \delta(q)dq = 0 \tag{1537}$$

$$A_2 + q\delta(q) - q - \int \log\left(q\right)dq = 0 \tag{1538}$$

$$A_2 - m_s + q\delta(q) - q\log\left(q\right) = 0 \tag{1539}$$

$$\frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log\left(q\right)) = \frac{d}{dA_2}0 \tag{1540}$$

1.3.66 Derivation 65

$$\cos\left(\phi_2\right) = \mathrm{A_y}\left(\phi_2\right) \tag{1541}$$

$$\frac{d}{d\phi_2}\cos\left(\phi_2\right) = \frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) \tag{1542}$$

$$-\sin\left(\phi_2\right) = \frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) \tag{1543}$$

$$-\sin\left(\phi_2\right) = \frac{d}{d\phi_2}\cos\left(\phi_2\right) \tag{1544}$$

$$\frac{d}{d\phi_2} - \sin\left(\phi_2\right) = \frac{d^2}{d\phi_2^2}\cos\left(\phi_2\right) \tag{1545}$$

$$\frac{d^2}{d\phi_2^2} - \sin\left(\phi_2\right) = \frac{d^3}{d\phi_2^3}\cos\left(\phi_2\right) \tag{1546}$$

1.3.67 Derivation 66

$$\sin\left(e^Q\right) = \mathbf{g}(Q) \tag{1547}$$

$$\frac{d}{dQ}\sin\left(e^Q\right) = \frac{d}{dQ}\mathbf{g}(Q) \tag{1548}$$

$$\frac{d}{dQ}\mathbf{g}(Q) + \frac{d}{dQ}\sin\left(e^Q\right) = 2\frac{d}{dQ}\mathbf{g}(Q) \tag{1549}$$

$$e^Q\cos\left(e^Q\right) + \frac{d}{dQ}\mathbf{g}(Q) = 2\frac{d}{dQ}\mathbf{g}(Q) \tag{1550}$$

$$\int (e^Q\cos\left(e^Q\right) + \frac{d}{dQ}\mathbf{g}(Q))dQ = \int 2\frac{d}{dQ}\mathbf{g}(Q)dQ \tag{1551}$$

1.3.68 Derivation 67

$$\frac{d}{d\varphi^*}e^{\varphi^*} = l(\varphi^*) \tag{1552}$$

$$\frac{d}{d\varphi^*}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{1553}$$

$$e^{\varphi^*} = l(\varphi^*) \tag{1554}$$

$$\frac{d}{d\varphi^*}e^{\varphi^*} = e^{\varphi^*} \tag{1555}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{1556}$$

1.3.69 Derivation 68

$$\cos(M_E) = l(M_E) \tag{1557}$$

$$\frac{d}{dM_E}\cos(M_E) = \frac{d}{dM_E}l(M_E) \tag{1558}$$

$$0 = \frac{d}{dM_E}l(M_E) - \frac{d}{dM_E}\cos(M_E) \tag{1559}$$

$$0 = \sin(M_E) + \frac{d}{dM_E}l(M_E) \tag{1560}$$

$$0 = \sin(M_E) + \frac{d}{dM_E}\cos(M_E) \tag{1561}$$

$$\int 0 dM_E = \int (\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E \tag{1562}$$

$$\int 0 dM_E - 1 = \int (\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E - 1 \tag{1563}$$

$$\int 0 dM_E - 1 = y' - 1 \tag{1564}$$

$$\int (\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E - 1 = y' - 1 \tag{1565}$$

1.3.70 Derivation 69

$$\sin(C_2) = \hat{\mathbf{x}}(C_2) \tag{1566}$$

$$\frac{d}{dC_2}\sin(C_2) = \frac{d}{dC_2}\hat{\mathbf{x}}(C_2) \tag{1567}$$

$$\int \frac{d}{dC_2}\sin(C_2)dC_2 = \int \frac{d}{dC_2}\hat{\mathbf{x}}(C_2)dC_2 \tag{1568}$$

$$\varepsilon + \sin(C_2) = c + \hat{\mathbf{x}}(C_2) \tag{1569}$$

$$\varepsilon + \hat{\mathbf{x}}(C_2) = c + \hat{\mathbf{x}}(C_2) \tag{1570}$$

$$\varepsilon + \sin(C_2) = c + \sin(C_2) \tag{1571}$$

$$2\varepsilon + 2\sin(C_2) = \varepsilon + c + 2\sin(C_2) \tag{1572}$$

$$\frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) \tag{1573}$$

1.3.71 Derivation 70

$$\cos(U) = \hat{\mathbf{r}}(U) \tag{1574}$$

$$\hat{\mathbf{r}}(U)\cos(U) = \hat{\mathbf{r}}^2(U) \tag{1575}$$

$$\frac{\cos(U)}{\hat{\mathbf{r}}(U)} = 1 \tag{1576}$$

$$\cos^2(U) = \hat{\mathbf{r}}(U)\cos(U) \tag{1577}$$

$$\cos^2(U) = \hat{\mathbf{r}}^2(U) \tag{1578}$$

$$\int \cos^2(U)dU = \int \hat{\mathbf{r}}^2(U)dU \tag{1579}$$

$$\frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} = \int \hat{\mathbf{r}}^2(U)dU \tag{1580}$$

$$\int \cos^2(U)dU = \frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} \tag{1581}$$

1.3.72 Derivation 71

$$G - L = \mathrm{v_x}(G, L) \tag{1582}$$

$$G = L + \mathrm{v_x}(G, L) \tag{1583}$$

$$\frac{d}{dG}G = \frac{\partial}{\partial G}(L + \mathrm{v_x}(G, L)) \tag{1584}$$

$$1 = \frac{\partial}{\partial G}\mathrm{v_x}(G, L) \tag{1585}$$

$$1 = (\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G \tag{1586}$$

$$1 = ((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G \tag{1587}$$

$$1 = (((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G \tag{1588}$$

1.3.73 Derivation 72

$$\cos(\theta_1) = \mathrm{A_1}(\theta_1) \tag{1589}$$

$$\cos^2(\theta_1) = \mathrm{A_1}(\theta_1)\cos(\theta_1) \tag{1590}$$

$$\int \cos^2(\theta_1)d\theta_1 = \int \mathrm{A_1}(\theta_1)\cos(\theta_1)d\theta_1 \tag{1591}$$

$$\frac{\theta_1}{2}+t_2+\frac{\sin(\theta_1)\cos(\theta_1)}{2} = \int \mathrm{A_1}(\theta_1)\cos(\theta_1)d\theta_1 \tag{1592}$$

$$\int \cos^2(\theta_1)d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} \tag{1593}$$

1.3.74 Derivation 73

$$J_\varepsilon \mathbf{J}_M = \mathbf{g}(J_\varepsilon, \mathbf{J}_M) \tag{1594}$$

$$J_\varepsilon \mathbf{J}_M - J_\varepsilon = -J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M) \tag{1595}$$

$$\frac{\partial}{\partial \mathbf{J}_M}(J_\varepsilon \mathbf{J}_M - J_\varepsilon) = \frac{\partial}{\partial \mathbf{J}_M}(-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M)) \tag{1596}$$

$$J_\varepsilon = \frac{\partial}{\partial \mathbf{J}_M}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) \tag{1597}$$

$$\frac{d}{d\mathbf{J}_M}J_\varepsilon = \frac{\partial^2}{\partial \mathbf{J}_M^2}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) \tag{1598}$$

1.3.75 Derivation 74

$$s(\mathbf{J}_P + \rho_b) = \Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{1599}$$

$$\frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{1600}$$

$$\mathbf{J}_P + \rho_b = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{1601}$$

$$\frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{1602}$$

1.3.76 Derivation 75

$$\sin(F_N) = \mathrm{A_z}(F_N) \tag{1603}$$

$$\int \sin(F_N)dF_N = \int \mathrm{A_z}(F_N)dF_N \tag{1604}$$

$$(\int \mathrm{A_z}(F_N)dF_N)^2 = \mathbf{v}(F_N) \tag{1605}$$

$$(\int \sin(F_N)dF_N)^2 = \mathbf{v}(F_N) \tag{1606}$$

$$(Q - \cos(F_N))^2 = \mathbf{v}(F_N) \tag{1607}$$

$$(\int \sin(F_N)dF_N)^2 = (\int \mathrm{A_z}(F_N)dF_N)^2 \tag{1608}$$

$$(Q - \cos(F_N))^2 = (\int \mathrm{A_z}(F_N)dF_N)^2 \tag{1609}$$

$$(Q - \cos(F_N))^2 = (\int \sin(F_N)dF_N)^2 \tag{1610}$$

1.3.77 Derivation 76

$$\sin(\hat{X}) = r(\hat{X}) \tag{1611}$$

$$\frac{d}{d\hat{X}}\sin(\hat{X}) = \frac{d}{d\hat{X}}r(\hat{X}) \tag{1612}$$

$$\cos(\hat{X}) = \frac{d}{d\hat{X}}r(\hat{X}) \tag{1613}$$

$$\frac{d}{d\hat{X}}\cos(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{1614}$$

$$-\sin(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{1615}$$

1.3.78 Derivation 77

$$e^{\sin(\dot{z})} = A(\dot{z}) \tag{1616}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{1617}$$

$$e^{\sin(\dot{z})}\cos(\dot{z}) = \frac{d}{d\dot{z}}A(\dot{z}) \tag{1618}$$

$$-A(\dot{z}) + e^{\sin(\dot{z})}\cos(\dot{z}) = -A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z}) \tag{1619}$$

$$e^{-A(\dot{z})+e^{\sin(\dot{z})}\cos(\dot{z})} = e^{-A(\dot{z})+\frac{d}{d\dot{z}}A(\dot{z})} \tag{1620}$$

$$(e^{-A(\dot{z})+e^{\sin(\dot{z})}\cos(\dot{z})})^{\dot{z}} = (e^{-A(\dot{z})+\frac{d}{d\dot{z}}A(\dot{z})})^{\dot{z}} \tag{1621}$$

1.3.79 Derivation 78

$$\cos(L_\varepsilon) = \dot{z}(L_\varepsilon) \tag{1622}$$

$$\int \cos(L_\varepsilon)dL_\varepsilon = \int \dot{z}(L_\varepsilon)dL_\varepsilon \tag{1623}$$

$$\int \cos(L_\varepsilon)dL_\varepsilon + 1 = \int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 \tag{1624}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 \tag{1625}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + 1 \tag{1626}$$

$$(\pi + \sin(L_\varepsilon) + 1)^\pi = (\int \cos(L_\varepsilon)dL_\varepsilon + 1)^\pi \tag{1627}$$

$$(\pi + \sin(L_\varepsilon) + 1)^\pi = (r_0 + \sin(L_\varepsilon) + 1)^\pi \tag{1628}$$

1.3.80 Derivation 79

$$\sin(\varepsilon_0) = \mathrm{f}'(\varepsilon_0) \tag{1629}$$

$$-\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0) = 0 \tag{1630}$$

$$\frac{d}{d\varepsilon_0}(-\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0)) = \frac{d}{d\varepsilon_0}0 \tag{1631}$$

$$\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) = 0 \tag{1632}$$

$$\int (\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0))d\varepsilon_0 = \int 0 d\varepsilon_0 \tag{1633}$$

1.3.81 Derivation 80

$$\frac{\mathbf{M}}{Q} = S(Q, \mathbf{M}) \tag{1634}$$

$$\frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} = \frac{\partial}{\partial Q}S(Q, \mathbf{M}) \tag{1635}$$

$$-\frac{\mathbf{M}}{Q^2} = \frac{\partial}{\partial Q}S(Q, \mathbf{M}) \tag{1636}$$

$$\int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} = \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} \tag{1637}$$

$$\int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} = 0 \tag{1638}$$

$$\int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} \tag{1639}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} = 0 \tag{1640}$$

1.3.82 Derivation 81

$$\int \sin(\hat{H}_l)d\hat{H}_l = \mathbf{F}(\hat{H}_l) \tag{1641}$$

$$V - \cos(\hat{H}_l) = \mathbf{F}(\hat{H}_l) \tag{1642}$$

$$\int \sin(\hat{H}_l)d\hat{H}_l = V - \cos(\hat{H}_l) \tag{1643}$$

$$-\int \sin(\hat{H}_l)d\hat{H}_l = -\mathbf{F}(\hat{H}_l) \tag{1644}$$

$$-V + \cos(\hat{H}_l) = -\mathbf{F}(\hat{H}_l) \tag{1645}$$

$$-C + \cos(\hat{H}_l) = -\mathbf{F}(\hat{H}_l) \tag{1646}$$

$$-C + \cos(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{1647}$$

$$(-C + \cos(\hat{H}_l))^C = (-\mathbf{F}(\hat{H}_l))^C \tag{1648}$$

$$(-V + \cos(\hat{H}_l))^C = (-\mathbf{F}(\hat{H}_l))^C \tag{1649}$$

1.3.83 Derivation 82

$$\frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) = \mathrm{f}'\left(\mathbf{J}_f\right) \tag{1650}$$

$$\cos\left(\mathbf{J}_f\right) = \mathrm{f}'\left(\mathbf{J}_f\right) \tag{1651}$$

$$\sin\left(\mathbf{J}_f\right)\frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) = \mathrm{f}'\left(\mathbf{J}_f\right)\sin\left(\mathbf{J}_f\right) \tag{1652}$$

$$\frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) = \cos\left(\mathbf{J}_f\right) \tag{1653}$$

$$\sin\left(\mathbf{J}_f\right)\cos\left(\mathbf{J}_f\right) = \mathrm{f}'\left(\mathbf{J}_f\right)\sin\left(\mathbf{J}_f\right) \tag{1654}$$

1.3.84 Derivation 83

$$W + \frac{q}{B} = y(W, q, B) \tag{1655}$$

$$W - y(W, q, B) + \frac{q}{B} = 0 \tag{1656}$$

$$\frac{\partial}{\partial q}(W - y(W, q, B) + \frac{q}{B}) = \frac{d}{dq}0 \tag{1657}$$

$$-\frac{\partial}{\partial q}y(W, q, B) + \frac{1}{B} = 0 \tag{1658}$$

$$-\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} = 0 \tag{1659}$$

1.3.85 Derivation 84

$$\int e^Z dZ = \mathbf{S}(Z) \tag{1660}$$

$$e^Z \int e^Z dZ = \mathbf{S}(Z)e^Z \tag{1661}$$

$$\hat{H}_\lambda + e^Z = \mathbf{S}(Z) \tag{1662}$$

$$e^Z \int e^Z dZ = (\hat{H}_\lambda + e^Z)e^Z \tag{1663}$$

$$(\phi + e^Z)e^Z = (\hat{H}_\lambda + e^Z)e^Z \tag{1664}$$

$$e^Z \int e^Z dZ = (\phi + e^Z)e^Z \tag{1665}$$

$$(e^Z \int e^Z dZ)^\phi = ((\phi + e^Z)e^Z)^\phi \tag{1666}$$

$$e^{(e^Z \int e^Z dZ)^\phi} = e^{((\phi+e^Z)e^Z)^\phi} \tag{1667}$$

1.3.86 Derivation 85

$$e^\varepsilon = \mathrm{A_x}\left(\varepsilon\right) \tag{1668}$$

$$\varepsilon + e^\varepsilon = \varepsilon + \mathrm{A_x}\left(\varepsilon\right) \tag{1669}$$

$$\frac{d}{d\varepsilon}e^\varepsilon = \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) \tag{1670}$$

$$e^\varepsilon = \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) \tag{1671}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) = \varepsilon + \mathrm{A_x}\left(\varepsilon\right) \tag{1672}$$

$$\mathrm{A_x}\left(\varepsilon\right) = \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) \tag{1673}$$

$$\varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}\left(\varepsilon\right) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) \tag{1674}$$

1.3.87 Derivation 86

$$\log\left(\phi_2\right) = C(\phi_2) \tag{1675}$$

$$C(\phi_2) + \log\left(\phi_2\right) = 2C(\phi_2) \tag{1676}$$

$$\frac{d}{d\phi_2}(C(\phi_2) + \log\left(\phi_2\right)) = \frac{d}{d\phi_2}2C(\phi_2) \tag{1677}$$

$$\frac{d}{d\phi_2}C(\phi_2) + \frac{1}{\phi_2} = 2\frac{d}{d\phi_2}C(\phi_2) \tag{1678}$$

$$\frac{d}{d\phi_2}\log\left(\phi_2\right) + \frac{1}{\phi_2} = 2\frac{d}{d\phi_2}\log\left(\phi_2\right) \tag{1679}$$

$$(\frac{d}{d\phi_2}\log\left(\phi_2\right) + \frac{1}{\phi_2})^2 = 4(\frac{d}{d\phi_2}\log\left(\phi_2\right))^2 \tag{1680}$$

1.3.88 Derivation 87

$$\int(\eta + g)dg = \mathrm{r_0}\left(\eta, g\right) \tag{1681}$$

$$\eta g + \sigma_p + \frac{g^2}{2} = \mathrm{r_0}\left(\eta, g\right) \tag{1682}$$

$$\eta g + \sigma_p + \frac{g^2}{2} = \int(\eta + g)dg \tag{1683}$$

$$\eta g+\sigma_p+\frac{g^2}{2}+\mathrm{r}_0\left(\eta,g\right)=\mathrm{r}_0\left(\eta,g\right)+\int(\eta+g)dg \tag{1684}$$

$$2\eta g+2\sigma_p+g^2=\eta g+\sigma_p+\frac{g^2}{2}+\int(\eta+g)dg \tag{1685}$$

1.3.89 Derivation 88

$$\sin\left(a\right)=\mathrm{L}_\varepsilon\left(a\right) \tag{1686}$$

$$\frac{d}{da}\mathrm{L}_\varepsilon\left(a\right)=V(a) \tag{1687}$$

$$(\frac{d}{da}\mathrm{L}_\varepsilon\left(a\right))^a=V^a(a) \tag{1688}$$

$$(\frac{d}{da}\sin\left(a\right))^a=V^a(a) \tag{1689}$$

$$((\frac{d}{da}\sin\left(a\right))^a)^a=(V^a(a))^a \tag{1690}$$

$$(\cos^a\left(a\right))^a=(V^a(a))^a \tag{1691}$$

$$(\cos^a\left(a\right))^a+(\frac{d}{da}\mathrm{L}_\varepsilon\left(a\right))^a=(V^a(a))^a+(\frac{d}{da}\mathrm{L}_\varepsilon\left(a\right))^a \tag{1692}$$

1.3.90 Derivation 89

$$\sin\left(\phi\right)=\mathrm{g}'_\varepsilon\left(\phi\right) \tag{1693}$$

$$\frac{d}{d\phi}\sin\left(\phi\right)=\frac{d}{d\phi}\mathrm{g}'_\varepsilon\left(\phi\right) \tag{1694}$$

$$0=\frac{d}{d\phi}\mathrm{g}'_\varepsilon\left(\phi\right)-\frac{d}{d\phi}\sin\left(\phi\right) \tag{1695}$$

$$0=-\cos\left(\phi\right)+\frac{d}{d\phi}\mathrm{g}'_\varepsilon\left(\phi\right) \tag{1696}$$

$$0^\phi=(-\cos\left(\phi\right)+\frac{d}{d\phi}\mathrm{g}'_\varepsilon\left(\phi\right))^\phi \tag{1697}$$

$$\frac{0^\phi}{-\cos\left(\phi\right)+\frac{d}{d\phi}\sin\left(\phi\right)}=\frac{(-\cos\left(\phi\right)+\frac{d}{d\phi}\mathrm{g}'_\varepsilon\left(\phi\right))^\phi}{-\cos\left(\phi\right)+\frac{d}{d\phi}\sin\left(\phi\right)} \tag{1698}$$

1.3.91 Derivation 90

$$e^\mu=\omega(\mu) \tag{1699}$$

$$\frac{e^\mu}{\omega(\mu)}=1 \tag{1700}$$

$$\int\frac{e^\mu}{\omega(\mu)}d\mu=\int 1d\mu \tag{1701}$$

$$\int\frac{e^\mu}{\omega(\mu)}d\mu=\mathbf{J}+\mu \tag{1702}$$

$$\int\frac{e^\mu}{\omega(\mu)}d\mu-\frac{1}{\omega(\mu)}=\mathbf{J}+\mu-\frac{1}{\omega(\mu)} \tag{1703}$$

$$\int\frac{e^\mu}{\omega(\mu)}d\mu+\frac{e^\mu}{\omega(\mu)}-\frac{1}{\omega(\mu)}=\mathbf{J}+\mu+\frac{e^\mu}{\omega(\mu)}-\frac{1}{\omega(\mu)} \tag{1704}$$

1.3.92 Derivation 91

$$\int\cos\left(q\right)dq=\mathrm{v_t}\left(q\right) \tag{1705}$$

$$E+\sin\left(q\right)=\mathrm{v_t}\left(q\right) \tag{1706}$$

$$\frac{\int\cos\left(q\right)dq}{E}=\frac{\mathrm{v_t}\left(q\right)}{E} \tag{1707}$$

$$\frac{\int\cos\left(q\right)dq}{E}=\frac{E+\sin\left(q\right)}{E} \tag{1708}$$

$$-E-\sin\left(q\right)+\frac{E+\sin\left(q\right)}{E}=\mathrm{y}'\left(q,E\right) \tag{1709}$$

$$-E-\sin\left(q\right)+\frac{\int\cos\left(q\right)dq}{E}=\mathrm{y}'\left(q,E\right) \tag{1710}$$

1.3.93 Derivation 92

$$\log\left(q\right)=\mathbf{J}(q) \tag{1711}$$

$$\frac{d}{dq}\log\left(q\right)=\frac{d}{dq}\mathbf{J}(q) \tag{1712}$$

$$\frac{1}{q}=\frac{d}{dq}\mathbf{J}(q) \tag{1713}$$

$$\frac{\mathbf{v}}{q}=\mathbf{v}\frac{d}{dq}\mathbf{J}(q) \tag{1714}$$

$$\frac{\mathbf{v}}{q}=\mathbf{v}\frac{d}{dq}\log\left(q\right) \tag{1715}$$

$$\int \frac{\mathbf{v}}{q} dq = \int \mathbf{v} \frac{d}{dq} \log{(q)} dq \tag{1716}$$

$$\iint \frac{\mathbf{v}}{q} dq dq = \iint \mathbf{v} \frac{d}{dq} \log{(q)} dq dq \tag{1717}$$

$$\frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log{(q)}} = \frac{\iint \mathbf{v} \frac{d}{dq} \log{(q)} dq dq}{\log{(q)}} \tag{1718}$$

1.3.94 Derivation 93

$$\int (-C_2 + \hat{p}) dC_2 = \mathbf{M}(C_2, \hat{p}) \tag{1719}$$

$$(\int (-C_2 + \hat{p}) dC_2)^{C_2} = \mathbf{M}^{C_2}(C_2, \hat{p}) \tag{1720}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} = \mathbf{M}^{C_2}(C_2, \hat{p}) \tag{1721}$$

$$(\int (-C_2 + \hat{p}) dC_2)^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} \tag{1722}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} \tag{1723}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} = \mathbf{M}^{C_2}(C_2, \hat{p}) \tag{1724}$$

1.3.95 Derivation 94

$$\sin{(e^{E_x})} = \mathbf{p}(E_x) \tag{1725}$$

$$\sin{(U)} = \dot{y}(U) \tag{1726}$$

$$\frac{d}{dU} \sin{(U)} = \frac{d}{dU} \dot{y}(U) \tag{1727}$$

$$\frac{d}{dE_x} \sin{(e^{E_x})} = \frac{d}{dE_x} \mathbf{p}(E_x) \tag{1728}$$

$$\cos{(U)} = \frac{d}{dU} \dot{y}(U) \tag{1729}$$

$$\cos{(U)} = \frac{d}{dU} \sin{(U)} \tag{1730}$$

$$\frac{d}{dU} \sin{(U)} + \frac{d}{dE_x} \sin{(e^{E_x})} = \frac{d}{dE_x} \mathbf{p}(E_x) + \frac{d}{dU} \sin{(U)} \tag{1731}$$

$$\cos{(U)} + \frac{d}{dE_x} \sin{(e^{E_x})} = \cos{(U)} + \frac{d}{dE_x} \mathbf{p}(E_x) \tag{1732}$$

1.3.96 Derivation 95

$$e^L = \mathrm{v_y}(L) \tag{1733}$$

$$\frac{d}{dL} e^L = \frac{d}{dL} \mathrm{v_y}(L) \tag{1734}$$

$$\mathrm{v_y}(L) + e^L = 2\,\mathrm{v_y}(L) \tag{1735}$$

$$\frac{d^2}{dL^2} e^L = \frac{d^2}{dL^2} \mathrm{v_y}(L) \tag{1736}$$

$$e^L = \frac{d^2}{dL^2} \mathrm{v_y}(L) \tag{1737}$$

$$\mathrm{v_y}(L) + \frac{d^2}{dL^2} \mathrm{v_y}(L) = 2\,\mathrm{v_y}(L) \tag{1738}$$

1.3.97 Derivation 96

$$\frac{h}{\mathbf{s}} = \psi(\mathbf{s}, h) \tag{1739}$$

$$1 = \frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} \tag{1740}$$

$$2 = \frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} + 1 \tag{1741}$$

$$\frac{\partial}{\partial h} \frac{h}{\mathbf{s}} = \frac{\partial}{\partial h} \psi(\mathbf{s}, h) \tag{1742}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h} \psi(\mathbf{s}, h) \tag{1743}$$

$$\frac{1}{\mathbf{s}^2} = \frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} \tag{1744}$$

$$\mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} - 1} = \frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} \tag{1745}$$

1.3.98 Derivation 97

$$e^{e^{F_g}} = \mathbf{J}_f(F_g) \tag{1746}$$

$$\int e^{e^{F_g}} dF_g = \int \mathbf{J}_f(F_g) dF_g \tag{1747}$$

$$h + \mathrm{Ei}{(e^{F_g})} = \int \mathbf{J}_f(F_g) dF_g \tag{1748}$$

$$h + \mathrm{Ei}{(e^{F_g})} + \int \mathbf{J}_f(F_g) dF_g = 2 \int \mathbf{J}_f(F_g) dF_g \tag{1749}$$

$$\int e^{e^{F_g}} dF_g = h + \mathrm{Ei}\left(e^{F_g}\right) \tag{1750}$$

$$\int \mathbf{J}_f(F_g) dF_g + \int e^{e^{F_g}} dF_g = 2 \int \mathbf{J}_f(F_g) dF_g \tag{1751}$$

$$z^* + \mathrm{Ei}\left(e^{F_g}\right) + \int \mathbf{J}_f(F_g) dF_g = 2 \int \mathbf{J}_f(F_g) dF_g \tag{1752}$$

1.3.99 Derivation 98

$$\log(\delta) = \Psi(\delta) \tag{1753}$$

$$\frac{d}{d\delta} \log(\delta) = \frac{d}{d\delta} \Psi(\delta) \tag{1754}$$

$$\frac{1}{\delta} = \frac{d}{d\delta} \Psi(\delta) \tag{1755}$$

$$\frac{1}{\delta} = \frac{d}{d\delta} \log(\delta) \tag{1756}$$

$$\frac{(\frac{d}{d\delta} \Psi(\delta))^{-\delta}}{\delta} = (\frac{d}{d\delta} \Psi(\delta))^{-\delta} \frac{d}{d\delta} \log(\delta) \tag{1757}$$

1.3.100 Derivation 99

$$G + \Omega = \mathbf{S}(G, \Omega) \tag{1758}$$

$$\frac{\partial}{\partial \Omega}(G + \Omega) = \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{1759}$$

$$1 = \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{1760}$$

$$G + \Omega = (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{1761}$$

$$(G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) = \mathrm{f}_{\mathbf{p}}(G, \Omega) \tag{1762}$$

$$(G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) = \mathrm{f}_{\mathbf{p}}(G, \Omega) \tag{1763}$$

$$(G+\Omega) \frac{\partial}{\partial \Omega} (G+\Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) = \mathrm{f}_{\mathbf{p}}(G, \Omega) \tag{1764}$$

1.4 Perturbation: AG

1.4.1 Derivation 0

$$\eta(a) = e^a \tag{1765}$$

$$\frac{d}{da} \eta(a) = \frac{d}{da} e^a \tag{1766}$$

$$\frac{d}{da} \eta(a) = e^a \tag{1767}$$

$$\frac{d}{da} \eta(a) = \eta(a) \tag{1768}$$

$$\eta(a) \frac{d}{da} \eta(a) = \eta^2(a) \tag{1769}$$

$$\frac{d}{da} \eta(a) = \frac{d^2}{da^2} \eta(a) \tag{1770}$$

$$\frac{d^2}{da^2} \eta(a) = \frac{d^3}{da^3} \eta(a) \tag{1771}$$

1.4.2 Derivation 1

$$\mathrm{J}_\varepsilon(\mathbf{s}) = \frac{d}{d\mathbf{s}} \sin(\mathbf{s}) \tag{1772}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_\varepsilon(\mathbf{s}) = \frac{d^2}{d\mathbf{s}^2} \sin(\mathbf{s}) \tag{1773}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_\varepsilon(\mathbf{s}) = -\sin(\mathbf{s}) \tag{1774}$$

$$\mathbf{s} + \frac{d}{d\mathbf{s}} \mathrm{J}_\varepsilon(\mathbf{s}) = \mathbf{s} - \sin(\mathbf{s}) \tag{1775}$$

1.4.3 Derivation 2

$$\mathbb{I}(\Psi_\lambda) = e^{\Psi_\lambda} \tag{1776}$$

$$\int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \int e^{\Psi_\lambda} d\Psi_\lambda \tag{1777}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \int e^{\Psi_\lambda} d\Psi_\lambda \tag{1778}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \chi + e^{\Psi_\lambda} \tag{1779}$$

$$\Psi_\lambda + \int e^{\Psi_\lambda} d\Psi_\lambda = \Psi_\lambda + \chi + e^{\Psi_\lambda} \tag{1780}$$

1.4.4 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \quad (1781)$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \quad (1782)$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \quad (1783)$$

$$\hat{x}_0 \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \quad (1784)$$

1.4.5 Derivation 4

$$\mathrm{V}_{\mathbf{B}}(P_e) = \sin(P_e) \quad (1785)$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) = \frac{d}{dP_e}\sin(P_e) \quad (1786)$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) = \cos(P_e) \quad (1787)$$

$$\frac{d}{dP_e}\sin(P_e) = \cos(P_e) \quad (1788)$$

$$\frac{\frac{d}{dP_e}\sin(P_e)}{P_e} = \frac{\cos(P_e)}{P_e} \quad (1789)$$

$$\frac{\frac{d}{dP_e}\sin(P_e)}{P_e} = \frac{\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e)}{P_e} \quad (1790)$$

1.4.6 Derivation 5

$$\mathrm{F_c}(\mathbf{J}, \mathbf{v}) = \int(\mathbf{J} + \mathbf{v})d\mathbf{J} \quad (1791)$$

$$\mathrm{F_c}(\mathbf{J}, \mathbf{v}) = \frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f \quad (1792)$$

$$\frac{\mathrm{F_c}(\mathbf{J}, \mathbf{v})}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \quad (1793)$$

$$\frac{2\,\mathrm{F_c}(\mathbf{J}, \mathbf{v})}{\mathbf{J}^2(\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f)} = \frac{2}{\mathbf{J}^2} \quad (1794)$$

1.4.7 Derivation 6

$$\mathbf{M}(J) = \cos(J) \quad (1795)$$

$$\int \mathbf{M}(J)dJ = \int \cos(J)dJ \quad (1796)$$

$$\int \mathbf{M}(J)dJ = F_g + \sin(J) \quad (1797)$$

$$F_g + \sin(J) = \int \cos(J)dJ \quad (1798)$$

$$(F_g + \sin(J))^{F_g} = (\int \cos(J)dJ)^{F_g} \quad (1799)$$

$$2(F_g + \sin(J))^{F_g} = (F_g + \sin(J))^{F_g} + (\int \cos(J)dJ)^{F_g} \quad (1800)$$

$$\frac{2(F_g + \sin(J))^{F_g}}{F_g} = \frac{(F_g + \sin(J))^{F_g} + (\int \cos(J)dJ)^{F_g}}{F_g} \quad (1801)$$

1.4.8 Derivation 7

$$\mathrm{C_d}(\mathbf{p}) = \sin(\mathbf{p}) \quad (1802)$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = \frac{d}{d\mathbf{p}}\sin(\mathbf{p}) \quad (1803)$$

$$F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) \quad (1804)$$

$$\int F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p})dF_c = \int F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c \quad (1805)$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = \cos(\mathbf{p}) \quad (1806)$$

$$\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) = \cos(\mathbf{p}) \quad (1807)$$

1.4.9 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x,\varphi\right) = -\sigma_x+\varphi \tag{1808}$$

$$\frac{\partial}{\partial\varphi}\mathrm{f_{\mathbf{p}}}\left(\sigma_x,\varphi\right) = \frac{\partial}{\partial\varphi}(-\sigma_x+\varphi) \tag{1809}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x,\varphi\right) = \frac{\partial^2}{\partial\varphi^2}(-\sigma_x+\varphi) \tag{1810}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x,\varphi\right) = 0 \tag{1811}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x,\varphi\right)} = 1 \tag{1812}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}(-\sigma_x+\varphi)} = 1 \tag{1813}$$

1.4.10 Derivation 9

$$\hat{p}_0(\phi,\mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H}+\phi) \tag{1814}$$

$$\hat{p}_0(\phi,\mathbf{H}) = 1 \tag{1815}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi,\mathbf{H}) = \frac{d}{d\phi}1 \tag{1816}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) = \frac{d}{d\phi}1 \tag{1817}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) = \frac{\partial}{\partial\phi}\hat{p}_0(\phi,\mathbf{H}) \tag{1818}$$

$$0 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi,\mathbf{H}) \tag{1819}$$

$$0 = \frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) \tag{1820}$$

$$0^{\mathbf{H}} = (\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi))^{\mathbf{H}} \tag{1821}$$

1.4.11 Derivation 10

$$\theta(q) = \cos\left(q\right) \tag{1822}$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos\left(q\right) \tag{1823}$$

$$\frac{d}{dq}\theta(q) = -\sin\left(q\right) \tag{1824}$$

$$-\sin\left(q\right) = \frac{d}{dq}\cos\left(q\right) \tag{1825}$$

$$(-\sin\left(q\right))^q = (\frac{d}{dq}\cos\left(q\right))^q \tag{1826}$$

$$\frac{d}{dq}(-\sin\left(q\right))^q = \frac{d}{dq}(\frac{d}{dq}\cos\left(q\right))^q \tag{1827}$$

1.4.12 Derivation 11

$$\mathrm{r}_0\left(\lambda,g\right) = \frac{\partial}{\partial g}(\lambda+g) \tag{1828}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0\left(\lambda,g\right) = \frac{\partial^2}{\partial g^2}(\lambda+g) \tag{1829}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0\left(\lambda,g\right) = 0 \tag{1830}$$

$$\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0\left(\lambda,g\right) = \frac{d}{d\lambda}0 \tag{1831}$$

$$\frac{\partial^2}{\partial g\partial\lambda}\mathrm{r}_0\left(\lambda,g\right) = 0 \tag{1832}$$

1.4.13 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log\left(\mathbf{g}\right) \tag{1833}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{1834}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{1835}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})\right) = \cos\left(\frac{1}{\mathbf{g}}\right) \tag{1836}$$

$$\frac{d}{d\mathbf{g}}\cos\left(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})\right) = \frac{d}{d\mathbf{g}}\cos\left(\frac{1}{\mathbf{g}}\right) \tag{1837}$$

1.4.14 Derivation 13

$$\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)=\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \tag{1838}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)=\mathbf{P}\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \tag{1839}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)=Q\mathbf{P} \tag{1840}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)-\cos\left(\sin\left(J\right)\right)=Q\mathbf{P}-\cos\left(\sin\left(J\right)\right) \tag{1841}$$

$$\int(\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)-\cos\left(\sin\left(J\right)\right))dQ=\int(Q\mathbf{P}-\cos\left(\sin\left(J\right)\right))dQ \tag{1842}$$

1.4.15 Derivation 14

$$\mathrm{a}^{\dagger}\left(u\right)=\cos\left(u\right) \tag{1843}$$

$$\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right)=\frac{d}{du}\cos\left(u\right) \tag{1844}$$

$$(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^{u}=(\frac{d}{du}\cos\left(u\right))^{u} \tag{1845}$$

$$(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^{u}=(-\sin\left(u\right))^{u} \tag{1846}$$

$$(\frac{d}{du}\cos\left(u\right))^{u}=(-\sin\left(u\right))^{u} \tag{1847}$$

$$-\sin\left(u\right)+(\frac{d}{du}\cos\left(u\right))^{u}=(-\sin\left(u\right))^{u}-\sin\left(u\right) \tag{1848}$$

1.4.16 Derivation 15

$$\mathrm{A}_{2}\left(\hat{H},\mathbf{B}\right)=\log\left(\mathbf{B}^{\hat{H}}\right) \tag{1849}$$

$$\hat{H}_{\lambda}(y)=\cos\left(y\right) \tag{1850}$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial\hat{H}}\,\mathrm{A}_{2}\left(\hat{H},\mathbf{B}\right)}=\frac{\cos\left(y\right)}{\frac{\partial}{\partial\hat{H}}\,\mathrm{A}_{2}\left(\hat{H},\mathbf{B}\right)} \tag{1851}$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial\hat{H}}\log\left(\mathbf{B}^{\hat{H}}\right)}=\frac{\cos\left(y\right)}{\frac{\partial}{\partial\hat{H}}\log\left(\mathbf{B}^{\hat{H}}\right)} \tag{1852}$$

$$\frac{\hat{H}_{\lambda}(y)}{\log\left(\mathbf{B}\right)}=\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)} \tag{1853}$$

$$(\frac{\hat{H}_{\lambda}(y)}{\log\left(\mathbf{B}\right)})^{\mathbf{B}}=(\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)})^{\mathbf{B}} \tag{1854}$$

1.4.17 Derivation 16

$$f(C_{d})=C_{d} \tag{1855}$$

$$\frac{d}{dC_{d}}f(C_{d})=\frac{d}{dC_{d}}C_{d} \tag{1856}$$

$$\frac{d}{dC_{d}}f(C_{d})=1 \tag{1857}$$

$$1=\frac{1}{\frac{d}{dC_{d}}f(C_{d})} \tag{1858}$$

$$1=\frac{1}{\frac{d}{dC_{d}}C_{d}} \tag{1859}$$

$$2=1+\frac{1}{\frac{d}{dC_{d}}C_{d}} \tag{1860}$$

1.4.18 Derivation 17

$$\hat{X}(f')=\cos\left(f'\right) \tag{1861}$$

$$\frac{d}{df'}\hat{X}(f')=\frac{d}{df'}\cos\left(f'\right) \tag{1862}$$

$$\frac{d^{2}}{d(f')^{2}}\hat{X}(f')=\frac{d^{2}}{d(f')^{2}}\cos\left(f'\right) \tag{1863}$$

$$\frac{d^{2}}{d(f')^{2}}\hat{X}(f')=-\cos\left(f'\right) \tag{1864}$$

$$\frac{d^{2}}{d(f')^{2}}\cos\left(f'\right)=-\cos\left(f'\right) \tag{1865}$$

1.4.19 Derivation 18

$$W(P_{e})=\log\left(P_{e}\right) \tag{1866}$$

$$\frac{d}{dP_{e}}W(P_{e})=\frac{d}{dP_{e}}\log\left(P_{e}\right) \tag{1867}$$

$$\frac{d}{dP_{e}}W(P_{e})=\frac{1}{P_{e}} \tag{1868}$$

$$\frac{d}{dP_{e}}\log\left(P_{e}\right)=\frac{1}{P_{e}} \tag{1869}$$

$$-P_{e}+\frac{d}{dP_{e}}\log\left(P_{e}\right)=-P_{e}+\frac{1}{P_{e}} \tag{1870}$$

1.4.20 Derivation 19

$$\mathrm{E}_\lambda(\hat{H}_l) = \int e^{\hat{H}_l} d\hat{H}_l \tag{1871}$$

$$0 = -\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l \tag{1872}$$

$$0 = (-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l) \int e^{\hat{H}_l} d\hat{H}_l \tag{1873}$$

$$0 = ((-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l)^2) \int e^{\hat{H}_l} d\hat{H}_l \tag{1874}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 \tag{1875}$$

$$0 = (A_y + e^{\hat{H}_l})^2(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^4 \tag{1876}$$

1.4.21 Derivation 20

$$\mathrm{n}_2(V_{\mathbf{B}}, \mu_0) = \cos(V_{\mathbf{B}} + \mu_0) \tag{1877}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = \int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 \tag{1878}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{1879}$$

$$\int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{1880}$$

1.4.22 Derivation 21

$$\mathrm{E}_\mathrm{n}(S) = \int e^S dS \tag{1881}$$

$$\mathrm{E}_\mathrm{n}(S) = x + e^S \tag{1882}$$

$$x + e^S = \int e^S dS \tag{1883}$$

$$x + e^S = T + e^S \tag{1884}$$

$$\int (x + e^S) dT = \int (T + e^S) dT \tag{1885}$$

$$\int \mathrm{E}_\mathrm{n}(S) dT = \int (T + e^S) dT \tag{1886}$$

$$\int \mathrm{E}_\mathrm{n}(S) dT = \frac{T^2}{2} + Te^S + \psi^* \tag{1887}$$

$$\frac{T^2}{2} + Te^S + \psi^* = \int (T + e^S) dT \tag{1888}$$

$$\frac{T^2}{2} + Te^S + \psi^* = \frac{T^2}{2} + Te^S + \mathbf{S} \tag{1889}$$

1.4.23 Derivation 22

$$\mathrm{A}_\mathrm{x}(Z, \rho) = \frac{\partial}{\partial \rho} Z\rho \tag{1890}$$

$$\mathrm{A}_\mathrm{x}(Z, \rho) = Z \tag{1891}$$

$$Z + \mathrm{A}_\mathrm{x}(Z, \rho) = Z + \frac{\partial}{\partial \rho} Z\rho \tag{1892}$$

$$Z + \rho + \mathrm{A}_\mathrm{x}(Z, \rho) = Z + \rho + \frac{\partial}{\partial \rho} Z\rho \tag{1893}$$

$$\int (Z + \rho + \mathrm{A}_\mathrm{x}(Z, \rho)) d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho) d\rho \tag{1894}$$

$$\int (2Z + \rho) d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho) d\rho \tag{1895}$$

$$\int (2Z + \rho) d\rho = \int (Z + \rho + \mathrm{A}_\mathrm{x}(Z, \rho)) d\rho \tag{1896}$$

1.4.24 Derivation 23

$$\mathbf{p}(\phi) = \cos(e^\phi) \tag{1897}$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos(e^\phi) d\phi \tag{1898}$$

$$\iint \mathbf{p}(\phi) d\phi d\phi = \iint \cos(e^\phi) d\phi d\phi \tag{1899}$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}(e^\phi) \tag{1900}$$

$$\int \cos(e^{\phi})d\phi = \omega + \mathrm{Ci}(e^{\phi}) \tag{1901}$$

$$\iint \cos(e^{\phi})d\phi d\phi = \int (\omega + \mathrm{Ci}(e^{\phi}))d\phi \tag{1902}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi)d\phi d\phi = \frac{d}{d\phi}\iint \cos(e^{\phi})d\phi d\phi \tag{1903}$$

$$\int \mathbf{p}(\phi)d\phi = \mathrm{Ci}(e^{\phi}) \tag{1904}$$

1.4.25 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{1905}$$

$$\int y(A_x)dA_x = \int \frac{1}{A_x}dA_x \tag{1906}$$

$$\int y(A_x)dA_x = \varepsilon_0 + \log(A_x) \tag{1907}$$

$$\int \frac{1}{A_x}dA_x = \varepsilon_0 + \log(A_x) \tag{1908}$$

$$\int \frac{1}{A_x}dA_x - \frac{x}{A_x} = \varepsilon_0 + \log(A_x) - \frac{x}{A_x} \tag{1909}$$

$$\frac{\partial}{\partial\varepsilon_0}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial\varepsilon_0}(\varepsilon_0 + \log(A_x) - \frac{x}{A_x}) \tag{1910}$$

1.4.26 Derivation 25

$$\theta_1(g) = e^g \tag{1911}$$

$$\int \theta_1(g)dg = \int e^g dg \tag{1912}$$

$$(\int \theta_1(g)dg)^g = (\int e^g dg)^g \tag{1913}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{d}{dg}(\int e^g dg)^g \tag{1914}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \tag{1915}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{d}{dg}(\int e^g dg)^g \tag{1916}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{\partial}{\partial g}(L + e^g)^g \tag{1917}$$

1.4.27 Derivation 26

$$\chi(P_e) = \cos(P_e) \tag{1918}$$

$$\int \chi(P_e)dP_e = \int \cos(P_e)dP_e \tag{1919}$$

$$\frac{d}{dP_e}\int \chi(P_e)dP_e = \frac{d}{dP_e}\int \cos(P_e)dP_e \tag{1920}$$

$$\frac{d}{dP_e}\int \chi(P_e)dP_e = \frac{\partial}{\partial P_e}(\psi + \sin(P_e)) \tag{1921}$$

$$\frac{d}{dP_e}\int \cos(P_e)dP_e = \frac{\partial}{\partial P_e}(\psi + \sin(P_e)) \tag{1922}$$

1.4.28 Derivation 27

$$\phi(x') = \int \log(x')dx' \tag{1923}$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log(x')dx' \tag{1924}$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \tag{1925}$$

$$\mathrm{t}_1(x', n_2) = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \tag{1926}$$

$$\mathrm{t}_1(x', n_2) = \frac{d}{dx'}\phi(x') \tag{1927}$$

$$\frac{\mathrm{t}_1(x', n_2)}{n_2 + x'\log(x') - x'} = \frac{\frac{d}{dx'}\phi(x')}{n_2 + x'\log(x') - x'} \tag{1928}$$

1.4.29 Derivation 28

$$f(t_1) = e^{t_1} \tag{1929}$$

$$\frac{d}{dt_1}f(t_1) = \frac{d}{dt_1}e^{t_1} \tag{1930}$$

$$\frac{d}{dt_1}f(t_1) = e^{t_1} \tag{1931}$$

$$\frac{d}{dt_1}f(t_1) = \frac{d^2}{dt_1^2}f(t_1) \tag{1932}$$

$$(\frac{d}{dt_1}f(t_1))^2 = (\frac{d^2}{dt_1^2}f(t_1))^2 \tag{1933}$$

$$e^{-t_1}(\frac{d}{dt_1}f(t_1))^2 = e^{-t_1}(\frac{d^2}{dt_1^2}f(t_1))^2 \tag{1934}$$

1.4.30 Derivation 29

$$q(c_0) = e^{c_0} \tag{1935}$$

$$\int q(c_0)dc_0 = \int e^{c_0}dc_0 \tag{1936}$$

$$e^{-c_0}\int q(c_0)dc_0 = e^{-c_0}\int e^{c_0}dc_0 \tag{1937}$$

$$e^{-c_0}\int q(c_0)dc_0 = (n+e^{c_0})e^{-c_0} \tag{1938}$$

$$e^{-c_0} = \frac{(n+e^{c_0})e^{-c_0}}{\int q(c_0)dc_0} \tag{1939}$$

1.4.31 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{1940}$$

$$b^{A_x}(A_x, i) = (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} \tag{1941}$$

$$b^{A_x}(A_x, i) - (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} = 0 \tag{1942}$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \tag{1943}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{1944}$$

$$\frac{-(-1)^{A_x} + (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x}}{i} = 0 \tag{1945}$$

1.4.32 Derivation 31

$$A(\mathbf{P}) = \int \log(\mathbf{P})d\mathbf{P} \tag{1946}$$

$$A(\mathbf{P}) = \mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 \tag{1947}$$

$$\int \log(\mathbf{P})d\mathbf{P} = \mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1 \tag{1948}$$

$$(\int \log(\mathbf{P})d\mathbf{P})^{\theta_1} = (\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{1949}$$

$$(\int \log(\mathbf{P})d\mathbf{P})^{\theta_1} = A^{\theta_1}(\mathbf{P}) \tag{1950}$$

$$A^{\theta_1}(\mathbf{P}) = (\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{1951}$$

$$\theta_1 A^{\theta_1}(\mathbf{P}) = \theta_1(\mathbf{P}\log(\mathbf{P}) - \mathbf{P} + \theta_1)^{\theta_1} \tag{1952}$$

1.4.33 Derivation 32

$$\mathrm{P_e}(\dot{z}) = \sin(\dot{z}) \tag{1953}$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \frac{d}{d\dot{z}}\sin(\dot{z}) \tag{1954}$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \cos(\dot{z}) \tag{1955}$$

$$\sin(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \sin(\dot{z})\cos(\dot{z}) \tag{1956}$$

$$\frac{\sin(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z})}{\mathrm{P_e}(\dot{z})} = \frac{\sin(\dot{z})\cos(\dot{z})}{\mathrm{P_e}(\dot{z})} \tag{1957}$$

1.4.34 Derivation 33

$$\mathbf{J}(\mathbf{A}) = \sin(e^{\mathbf{A}}) \tag{1958}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = \frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}}) \tag{1959}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = e^{\mathbf{A}}\cos(e^{\mathbf{A}}) \tag{1960}$$

$$\frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}}) = e^{\mathbf{A}}\cos(e^{\mathbf{A}}) \tag{1961}$$

$$\int \frac{d}{d\mathbf{A}}\sin(e^{\mathbf{A}})d\mathbf{A} = \int e^{\mathbf{A}}\cos(e^{\mathbf{A}})d\mathbf{A} \tag{1962}$$

1.4.35 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{1963}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{1964}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{1965}$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\varepsilon}{v_1} \tag{1966}$$

1.4.36 Derivation 35

$$\lambda(V) = V \tag{1967}$$

$$1 = \frac{V}{\lambda(V)} \tag{1968}$$

$$\frac{d}{dV}1 = \frac{d}{dV}\frac{V}{\lambda(V)} \tag{1969}$$

$$\frac{d}{dV}1 - \frac{d}{dV}\frac{V}{\lambda(V)} = 0 \tag{1970}$$

$$\frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} = 0 \tag{1971}$$

$$\frac{\frac{d}{dV}V}{V} - \frac{1}{V} = 0 \tag{1972}$$

$$V(\frac{\frac{d}{dV}V}{V} - \frac{1}{V}) = 0 \tag{1973}$$

1.4.37 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = A + V - \dot{z} \tag{1974}$$

$$\int \mathrm{f}'(\dot{z}, V, A)dV = \int (A + V - \dot{z})dV \tag{1975}$$

$$\int \mathrm{f}'(\dot{z}, V, A)dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{1976}$$

$$\iint \mathrm{f}'(\dot{z}, V, A)dVdV = \int (\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A})dV \tag{1977}$$

1.4.38 Derivation 37

$$\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} \tag{1978}$$

$$\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{1979}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}2e^{\mathbf{S}} \tag{1980}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) = 2e^{\mathbf{S}} \tag{1981}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{1982}$$

1.4.39 Derivation 38

$$J(\phi_1) = \sin(\phi_1) \tag{1983}$$

$$\frac{d}{d\phi_1}J(\phi_1) = \frac{d}{d\phi_1}\sin(\phi_1) \tag{1984}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) \tag{1985}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) \tag{1986}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) = \sin(\phi_1)\cos(\phi_1) \tag{1987}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) - \frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) - \frac{d}{d\phi_1}J(\phi_1) \tag{1988}$$

1.4.40 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{1989}$$

$$\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0)d\mathbf{A} \tag{1990}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{1991}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{1992}$$

$$(\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{1993}$$

1.4.41 Derivation 40

$$\hat{p}(k, \hat{H}_\lambda) = \frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} \tag{1994}$$

$$\hat{p}(k, \hat{H}_\lambda) - \frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} = 0 \tag{1995}$$

$$\hat{p}(k, \hat{H}_\lambda) = \frac{1}{k} \tag{1996}$$

$$\frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} = \frac{1}{k} \tag{1997}$$

1.4.42 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{1998}$$

$$\int \mathrm{F_x}(\pi)d\pi = \int e^{e^{\pi}}d\pi \tag{1999}$$

$$\int \mathrm{F_x}(\pi)d\pi = P_g + \mathrm{Ei}(e^{\pi}) \tag{2000}$$

$$0 = -\int \mathrm{F_x}(\pi)d\pi + \int e^{e^{\pi}}d\pi \tag{2001}$$

$$0 = F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi \tag{2002}$$

$$\int 0d\pi = \int (F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi)d\pi \tag{2003}$$

1.4.43 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c\cos(\lambda) \tag{2004}$$

$$\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c) = \frac{\partial}{\partial c}c\cos(\lambda) \tag{2005}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} = (\frac{\partial}{\partial c}c\cos(\lambda))^{\lambda} \tag{2006}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} = \cos^{\lambda}(\lambda) \tag{2007}$$

$$(\frac{\partial}{\partial c}c\cos(\lambda))^{\lambda} = \cos^{\lambda}(\lambda) \tag{2008}$$

1.4.44 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{2009}$$

$$G(\nabla) + \int \cos(\nabla)d\nabla = \cos(\nabla) + \int \cos(\nabla)d\nabla \tag{2010}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{2011}$$

$$\int (\varphi + G(\nabla) + \sin(\nabla))d\nabla = \int (\varphi + \sin(\nabla) + \cos(\nabla))d\nabla \tag{2012}$$

$$\frac{\int (\varphi + G(\nabla) + \sin(\nabla))d\nabla}{\varphi + G(\nabla) + \sin(\nabla)} = \frac{\int (\varphi + \sin(\nabla) + \cos(\nabla))d\nabla}{\varphi + G(\nabla) + \sin(\nabla)} \tag{2013}$$

1.4.45 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{2014}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{2015}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{2016}$$

$$(f^*\nabla(f^*, \pi))^{f^*} = (f^*)^{f^*} \tag{2017}$$

$$f^*\nabla(f^*, \pi) + (f^*\nabla(f^*, \pi))^{f^*} = f^*\nabla(f^*, \pi) + (f^*)^{f^*} \tag{2018}$$

$$f^*\frac{\partial}{\partial f^*}(\pi + f^*) + (f^*\frac{\partial}{\partial f^*}(\pi + f^*))^{f^*} = f^*\frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} \tag{2019}$$

1.4.46 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{2020}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{2021}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = -\frac{F_x}{\mathbf{r}^2} \tag{2022}$$

$$\frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}^2} \tag{2023}$$

$$-\frac{F_x}{\mathbf{r}} + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}} - \frac{F_x}{\mathbf{r}^2} \tag{2024}$$

1.4.47 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{2025}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{2026}$$

$$\int u(\lambda)d\lambda = n - \cos(\lambda) \tag{2027}$$

$$\int \sin(\lambda)d\lambda = n - \cos(\lambda) \tag{2028}$$

$$\iint \sin(\lambda)d\lambda dn = \int (n - \cos(\lambda))dn \tag{2029}$$

1.4.48 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{2030}$$

$$\phi_1 \mathrm{f}'(\phi_1) = \phi_1^2 \tag{2031}$$

$$\int \phi_1 \mathrm{f}'(\phi_1) d\phi_1 = \int \phi_1^2 d\phi_1 \tag{2032}$$

$$\int \phi_1 \mathrm{f}'(\phi_1) d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{2033}$$

$$\int \phi_1^2 d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{2034}$$

$$\dot{y} + \frac{\phi_1^3}{3} = \hbar + \frac{\phi_1^3}{3} \tag{2035}$$

1.4.49 Derivation 48

$$\mathrm{a}^\dagger(\omega) = \int \log(\omega) d\omega \tag{2036}$$

$$\mathrm{a}^\dagger(\omega) = \omega \log(\omega) - \omega + \rho \tag{2037}$$

$$-\rho + \mathrm{a}^\dagger(\omega) = \omega \log(\omega) - \omega \tag{2038}$$

$$(-\rho + \mathrm{a}^\dagger(\omega))^\omega = (\omega \log(\omega) - \omega)^\omega \tag{2039}$$

$$\rho + (-\rho + \mathrm{a}^\dagger(\omega))^\omega - \mathrm{a}^\dagger(\omega) = \rho + (\omega \log(\omega) - \omega)^\omega - \mathrm{a}^\dagger(\omega) \tag{2040}$$

1.4.50 Derivation 49

$$\hat{x}(f) = \int \log(f) df \tag{2041}$$

$$\hat{x}(f) = B + f \log(f) - f \tag{2042}$$

$$B + f \log(f) - f = \int \log(f) df \tag{2043}$$

$$(B + f \log(f) - f)^2 = (B + f \log(f) - f) \int \log(f) df \tag{2044}$$

1.4.51 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{2045}$$

$$\int \mathbf{v}(C_2) dC_2 = \int C_2 dC_2 \tag{2046}$$

$$\int \mathbf{v}(C_2) dC_2 = \frac{C_2^2}{2} + v \tag{2047}$$

$$\int \mathbf{v}(C_2) d\mathbf{v}(C_2) = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{2048}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{2049}$$

$$\mathbf{p} + v + \mathbf{v}^2(C_2) = 2v + \mathbf{v}^2(C_2) \tag{2050}$$

1.4.52 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{2051}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log(\mathbf{s}) d\mathbf{s} \tag{2052}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s} \log(\mathbf{s}) - \mathbf{s} + \omega \tag{2053}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{2054}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \log(\mathbf{s}) d\mathbf{s} \tag{2055}$$

1.4.53 Derivation 52

$$\mathrm{v_t}(t, \hat{X}) = \hat{X}^t \tag{2056}$$

$$\frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \frac{\partial}{\partial t} \hat{X}^t \tag{2057}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \frac{\partial}{\partial t} \hat{X}^t \tag{2058}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \hat{X}^t \log(\hat{X}) \tag{2059}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \mathrm{v_t}(t, \hat{X}) \log(\hat{X}) \tag{2060}$$

$$(\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}))^t = (\hat{X} + \mathrm{v_t}(t, \hat{X}) \log(\hat{X}))^t \tag{2061}$$

1.4.54 Derivation 53

$$\mathrm{A_y}\left(A\right) = e^{A} \tag{2062}$$

$$\frac{d}{dA}\mathrm{A_y}\left(A\right) = \frac{d}{dA}e^{A} \tag{2063}$$

$$(\frac{d}{dA}\mathrm{A_y}\left(A\right))^{A} = (\frac{d}{dA}e^{A})^{A} \tag{2064}$$

$$(\frac{d}{dA}\mathrm{A_y}\left(A\right))^{A} = (e^{A})^{A} \tag{2065}$$

$$(\frac{d}{dA}e^{A})^{A} = (e^{A})^{A} \tag{2066}$$

$$\frac{(\frac{d}{dA}e^{A})^{A}}{\frac{d}{dA}\mathrm{A_y}\left(A\right)} = \frac{(e^{A})^{A}}{\frac{d}{dA}\mathrm{A_y}\left(A\right)} \tag{2067}$$

1.4.55 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{2068}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{2069}$$

$$\frac{\partial}{\partial \mathbf{P}}\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}^2} \tag{2070}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{2071}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{2072}$$

1.4.56 Derivation 55

$$x(C_d) = \log\left(C_d\right) \tag{2073}$$

$$x^{C_d}(C_d) = \log\left(C_d\right)^{C_d} \tag{2074}$$

$$\frac{d}{dC_d}x^{C_d}(C_d) = \frac{d}{dC_d}\log\left(C_d\right)^{C_d} \tag{2075}$$

$$(\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log\left(x(C_d)\right))x^{C_d}(C_d) = (\log\left(\log\left(C_d\right)\right) + \frac{1}{\log\left(C_d\right)})\log\left(C_d\right)^{C_d} \tag{2076}$$

$$(\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log\left(x(C_d)\right))x^{C_d}(C_d) = (\log\left(\log\left(C_d\right)\right) + \frac{1}{\log\left(C_d\right)})x^{C_d}(C_d) \tag{2077}$$

1.4.57 Derivation 56

$$C(\psi^*) = \sin\left(\psi^*\right) \tag{2078}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \frac{d}{d\psi^*}\sin\left(\psi^*\right) \tag{2079}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \cos\left(\psi^*\right) \tag{2080}$$

$$C(\psi^*) + \frac{d}{d\psi^*}\sin\left(\psi^*\right) = \sin\left(\psi^*\right) + \frac{d}{d\psi^*}\sin\left(\psi^*\right) \tag{2081}$$

$$C(\psi^*) + \frac{d}{d\psi^*}C(\psi^*) = \sin\left(\psi^*\right) + \frac{d}{d\psi^*}C(\psi^*) \tag{2082}$$

$$1 = \frac{\sin\left(\psi^*\right) + \frac{d}{d\psi^*}C(\psi^*)}{C(\psi^*) + \frac{d}{d\psi^*}C(\psi^*)} \tag{2083}$$

1.4.58 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{2084}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{2085}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{2086}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{2087}$$

$$\frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} = \frac{f_{\mathbf{p}}}{y} \tag{2088}$$

1.4.59 Derivation 58

$$\mathrm{E_x}\left(t_2\right) = \frac{1}{t_2} \tag{2089}$$

$$\int \mathrm{E_x}\left(t_2\right)dt_2 = \int \frac{1}{t_2}dt_2 \tag{2090}$$

$$(\int \mathrm{E_x}\left(t_2\right)dt_2)^{t_2} = (\int \frac{1}{t_2}dt_2)^{t_2} \tag{2091}$$

$$\int \mathrm{E_x}\left(t_2\right)dt_2 = C_1 + \log\left(t_2\right) \tag{2092}$$

$$(C_1 + \log\left(t_2\right))^{t_2} = (\int \frac{1}{t_2}dt_2)^{t_2} \tag{2093}$$

$$(C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right))^{\frac{1}{\mathrm{E_x}\left(t_2\right)}} = (\int \frac{1}{t_2}dt_2)^{\frac{1}{\mathrm{E_x}\left(t_2\right)}} \tag{2094}$$

1.4.60 Derivation 59

$$\mathrm{M_E}\left(\psi^*\right) = \log\left(\psi^*\right) \tag{2095}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{d}{d\psi^*}\log\left(\psi^*\right) \tag{2096}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{1}{\psi^*} \tag{2097}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\log\left(\psi^*\right) \tag{2098}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*}\log\left(\psi^*\right))^{\psi^*} \tag{2099}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\log\left(\psi^*\right))^{\psi^*})^{\psi^*} \tag{2100}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right))^{\psi^*})^{\psi^*} \tag{2101}$$

1.4.61 Derivation 60

$$H(u) = e^u \tag{2102}$$

$$1 = \frac{e^u}{H(u)} \tag{2103}$$

$$\int 1du = \int \frac{e^u}{H(u)}du \tag{2104}$$

$$A_x + u = \int \frac{e^u}{H(u)}du \tag{2105}$$

$$A_x + u = \int 1du \tag{2106}$$

1.4.62 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{2107}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{2108}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = 0 \tag{2109}$$

$$(\frac{\partial}{\partial s}q(\mathbf{M}, s))^{\mathbf{M}} = 0^{\mathbf{M}} \tag{2110}$$

1.4.63 Derivation 62

$$\tilde{g}(\dot{y}, J_\varepsilon) = -J_\varepsilon + \dot{y} \tag{2111}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{2112}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = -1 \tag{2113}$$

$$-1 = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{2114}$$

$$(-1)^{J_\varepsilon} = (\frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}))^{J_\varepsilon} \tag{2115}$$

1.4.64 Derivation 63

$$\mathrm{A_x}\left(W, \chi\right) = \log\left(\chi^W\right) \tag{2116}$$

$$\int \mathrm{A_x}\left(W, \chi\right)dW = \int \log\left(\chi^W\right)dW \tag{2117}$$

$$\int \mathrm{A_x}\left(W, \chi\right)dW = M + \frac{W^2\log\left(\chi\right)}{2} \tag{2118}$$

$$\int \log\left(\chi^W\right)dW = M + \frac{W^2\log\left(\chi\right)}{2} \tag{2119}$$

$$C_d + \frac{W^2\log\left(\chi\right)}{2} = M + \frac{W^2\log\left(\chi\right)}{2} \tag{2120}$$

1.4.65 Derivation 64

$$\delta(q) = \log\left(q\right) \tag{2121}$$

$$\int \delta(q)dq = \int \log\left(q\right)dq \tag{2122}$$

$$0 = -\int \delta(q)dq + \int \log\left(q\right)dq \tag{2123}$$

$$0 = A_2 + q\log\left(q\right) - q - \int \delta(q)dq \tag{2124}$$

$$0 = A_2 + q\delta(q) - q - \int \delta(q)dq \tag{2125}$$

$$0 = A_2 + q\delta(q) - q - \int \log\left(q\right)dq \tag{2126}$$

$$0 = A_2 - m_s + q\delta(q) - q\log\left(q\right) \tag{2127}$$

$$0^q = (A_2 - m_s + q\delta(q) - q\log\left(q\right))^q \tag{2128}$$

1.4.66 Derivation 65

$$\mathrm{A_y}(\phi_2) = \cos(\phi_2) \tag{2129}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}(\phi_2) = \frac{d}{d\phi_2}\cos(\phi_2) \tag{2130}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}(\phi_2) = -\sin(\phi_2) \tag{2131}$$

$$\frac{d}{d\phi_2}\cos(\phi_2) = -\sin(\phi_2) \tag{2132}$$

$$\frac{d^2}{d\phi_2^2}\cos(\phi_2) = \frac{d}{d\phi_2} - \sin(\phi_2) \tag{2133}$$

$$\sin(\phi_2)+\frac{d^2}{d\phi_2^2}\cos(\phi_2) = \sin(\phi_2)+\frac{d}{d\phi_2}-\sin(\phi_2) \tag{2134}$$

1.4.67 Derivation 66

$$\mathbf{g}(Q) = \sin(e^Q) \tag{2135}$$

$$\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ}\sin(e^Q) \tag{2136}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ}\mathbf{g}(Q) + \frac{d}{dQ}\sin(e^Q) \tag{2137}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = e^Q\cos(e^Q) + \frac{d}{dQ}\mathbf{g}(Q) \tag{2138}$$

$$2\frac{d}{dQ}\sin(e^Q) = e^Q\cos(e^Q) + \frac{d}{dQ}\sin(e^Q) \tag{2139}$$

1.4.68 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{2140}$$

$$l(\varphi^*) - 1 = \frac{d}{d\varphi^*}e^{\varphi^*} - 1 \tag{2141}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{2142}$$

$$e^{\varphi^*} = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{2143}$$

$$e^{\varphi^*} + 1 = \frac{d}{d\varphi^*}e^{\varphi^*} + 1 \tag{2144}$$

1.4.69 Derivation 68

$$l(M_E) = \cos(M_E) \tag{2145}$$

$$\frac{d}{dM_E}l(M_E) = \frac{d}{dM_E}\cos(M_E) \tag{2146}$$

$$\frac{d}{dM_E}l(M_E) - \frac{d}{dM_E}\cos(M_E) = 0 \tag{2147}$$

$$\sin(M_E) + \frac{d}{dM_E}l(M_E) = 0 \tag{2148}$$

$$\sin(M_E) + \frac{d}{dM_E}\cos(M_E) = 0 \tag{2149}$$

$$\int(\sin(M_E)+\frac{d}{dM_E}\cos(M_E))dM_E = \int 0 dM_E \tag{2150}$$

$$\int(\sin(M_E)+\frac{d}{dM_E}\cos(M_E))dM_E-1 = \int 0 dM_E-1 \tag{2151}$$

$$y' - 1 = \int 0 dM_E - 1 \tag{2152}$$

$$\frac{d}{dM_E}(y'-1) = \frac{d}{dM_E}(\int 0 dM_E - 1) \tag{2153}$$

1.4.70 Derivation 69

$$\hat{\mathbf{x}}(C_2) = \sin(C_2) \tag{2154}$$

$$\frac{d}{dC_2}\hat{\mathbf{x}}(C_2) = \frac{d}{dC_2}\sin(C_2) \tag{2155}$$

$$\int\frac{d}{dC_2}\hat{\mathbf{x}}(C_2)dC_2 = \int\frac{d}{dC_2}\sin(C_2)dC_2 \tag{2156}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \sin(C_2) \tag{2157}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \hat{\mathbf{x}}(C_2) \tag{2158}$$

$$c + \sin(C_2) = \varepsilon + \sin(C_2) \tag{2159}$$

$$\varepsilon + c + 2\sin(C_2) = 2\varepsilon + 2\sin(C_2) \tag{2160}$$

$$(2\varepsilon+2\sin(C_2))(\varepsilon+c+2\sin(C_2)) = (2\varepsilon+2\sin(C_2))^2 \tag{2161}$$

1.4.71 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos{(U)} \tag{2162}$$

$$\hat{\mathbf{r}}^2(U) = \hat{\mathbf{r}}(U)\cos{(U)} \tag{2163}$$

$$1 = \frac{\cos{(U)}}{\hat{\mathbf{r}}(U)} \tag{2164}$$

$$\hat{\mathbf{r}}(U)\cos{(U)} = \cos^2{(U)} \tag{2165}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2{(U)} \tag{2166}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \int \cos^2{(U)}dU \tag{2167}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \frac{U}{2} + y + \frac{\sin{(U)}\cos{(U)}}{2} \tag{2168}$$

$$-\frac{U}{2} + \int \hat{\mathbf{r}}^2(U)dU = y + \frac{\sin{(U)}\cos{(U)}}{2} \tag{2169}$$

1.4.72 Derivation 71

$$\mathrm{v_x}\left(G, L\right) = G - L \tag{2170}$$

$$L + \mathrm{v_x}\left(G, L\right) = G \tag{2171}$$

$$\frac{\partial}{\partial G}(L + \mathrm{v_x}\left(G, L\right)) = \frac{d}{dG}G \tag{2172}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) = 1 \tag{2173}$$

$$(\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G = 1 \tag{2174}$$

$$((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G = 1 \tag{2175}$$

$$((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G + \frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) = \frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) + 1 \tag{2176}$$

1.4.73 Derivation 72

$$\mathrm{A_1}\left(\theta_1\right) = \cos{(\theta_1)} \tag{2177}$$

$$\mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)} = \cos^2{(\theta_1)} \tag{2178}$$

$$\int \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)}d\theta_1 = \int \cos^2{(\theta_1)}d\theta_1 \tag{2179}$$

$$\int \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} \tag{2180}$$

$$\int \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\mathrm{A_1}\left(\theta_1\right)\sin{(\theta_1)}}{2} \tag{2181}$$

1.4.74 Derivation 73

$$\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \mathbf{J}_M \tag{2182}$$

$$-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \mathbf{J}_M - J_\varepsilon \tag{2183}$$

$$\frac{\partial}{\partial \mathbf{J}_M}(-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M)) = \frac{\partial}{\partial \mathbf{J}_M}(J_\varepsilon \mathbf{J}_M - J_\varepsilon) \tag{2184}$$

$$\frac{\partial}{\partial \mathbf{J}_M}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \tag{2185}$$

$$\frac{\partial^2}{\partial J_\varepsilon \partial \mathbf{J}_M}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = \frac{d}{dJ_\varepsilon}J_\varepsilon \tag{2186}$$

1.4.75 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{2187}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{2188}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{2189}$$

$$\int \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)ds = \int (\mathbf{J}_P + \rho_b)ds \tag{2190}$$

1.4.76 Derivation 75

$$\mathrm{A_z}\,(F_N) = \sin{(F_N)} \tag{2191}$$

$$\int \mathrm{A_z}\,(F_N) dF_N = \int \sin{(F_N)} dF_N \tag{2192}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}\,(F_N) dF_N)^2 \tag{2193}$$

$$\mathbf{v}(F_N) = (\int \sin{(F_N)} dF_N)^2 \tag{2194}$$

$$\mathbf{v}(F_N) = (Q - \cos{(F_N)})^2 \tag{2195}$$

$$(\int \mathrm{A_z}\,(F_N) dF_N)^2 = (\int \sin{(F_N)} dF_N)^2 \tag{2196}$$

$$(\int \mathrm{A_z}\,(F_N) dF_N)^2 = (Q - \cos{(F_N)})^2 \tag{2197}$$

$$(\int \sin{(F_N)} dF_N)^2 = (Q - \cos{(F_N)})^2 \tag{2198}$$

1.4.77 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{2199}$$

$$\frac{d}{d\hat{X}} r(\hat{X}) = \frac{d}{d\hat{X}} \sin{(\hat{X})} \tag{2200}$$

$$\frac{d}{d\hat{X}} r(\hat{X}) = \cos{(\hat{X})} \tag{2201}$$

$$\frac{d^2}{d\hat{X}^2} r(\hat{X}) = \frac{d}{d\hat{X}} \cos{(\hat{X})} \tag{2202}$$

$$\frac{d^2}{d\hat{X}^2} \sin{(\hat{X})} = \frac{d}{d\hat{X}} \cos{(\hat{X})} \tag{2203}$$

1.4.78 Derivation 77

$$A(\dot{z}) = e^{\sin{(\dot{z})}} \tag{2204}$$

$$\frac{d}{d\dot{z}} A(\dot{z}) = \frac{d}{d\dot{z}} e^{\sin{(\dot{z})}} \tag{2205}$$

$$\frac{d}{d\dot{z}} A(\dot{z}) = e^{\sin{(\dot{z})}} \cos{(\dot{z})} \tag{2206}$$

$$-A(\dot{z}) + \frac{d}{d\dot{z}} A(\dot{z}) = -A(\dot{z}) + e^{\sin{(\dot{z})}} \cos{(\dot{z})} \tag{2207}$$

$$e^{-A(\dot{z}) + \frac{d}{d\dot{z}} A(\dot{z})} = e^{-A(\dot{z}) + e^{\sin{(\dot{z})}} \cos{(\dot{z})}} \tag{2208}$$

$$e^{-A(\dot{z}) + \frac{d}{d\dot{z}} A(\dot{z})} = e^{A(\dot{z}) \cos{(\dot{z})} - A(\dot{z})} \tag{2209}$$

1.4.79 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{2210}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \int \cos{(L_\varepsilon)} dL_\varepsilon \tag{2211}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \int \cos{(L_\varepsilon)} dL_\varepsilon + 1 \tag{2212}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{2213}$$

$$\int \cos{(L_\varepsilon)} dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{2214}$$

$$(\int \cos{(L_\varepsilon)} dL_\varepsilon + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{2215}$$

$$(g_\varepsilon + \sin{(L_\varepsilon)} + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{2216}$$

1.4.80 Derivation 79

$$\mathrm{f}'\,(\varepsilon_0) = \sin{(\varepsilon_0)} \tag{2217}$$

$$0 = -\,\mathrm{f}'\,(\varepsilon_0) + \sin{(\varepsilon_0)} \tag{2218}$$

$$\frac{d}{d\varepsilon_0} 0 = \frac{d}{d\varepsilon_0} (-\,\mathrm{f}'\,(\varepsilon_0) + \sin{(\varepsilon_0)}) \tag{2219}$$

$$0 = \cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0} \mathrm{f}'\,(\varepsilon_0) \tag{2220}$$

$$0 = \cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0} \sin{(\varepsilon_0)} \tag{2221}$$

1.4.81 Derivation 80

$$S(Q,\mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{2222}$$

$$\frac{\partial}{\partial Q}S(Q,\mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{2223}$$

$$\frac{\partial}{\partial Q}S(Q,\mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{2224}$$

$$\int \frac{\partial}{\partial Q}S(Q,\mathbf{M})d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{2225}$$

$$0 = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q,\mathbf{M})d\mathbf{M} \tag{2226}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{2227}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int \frac{\partial}{\partial Q}S(Q,\mathbf{M})d\mathbf{M} \tag{2228}$$

1.4.82 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l)d\hat{H}_l \tag{2229}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{2230}$$

$$V - \cos(\hat{H}_l) = \int \sin(\hat{H}_l)d\hat{H}_l \tag{2231}$$

$$-\mathbf{F}(\hat{H}_l) = -\int \sin(\hat{H}_l)d\hat{H}_l \tag{2232}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{2233}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{2234}$$

$$-V + \cos(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{2235}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-C + \cos(\hat{H}_l))^C \tag{2236}$$

$$(-\int \sin(\hat{H}_l)d\hat{H}_l)^C = (-C + \cos(\hat{H}_l))^C \tag{2237}$$

1.4.83 Derivation 82

$$\mathrm{f}'(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{2238}$$

$$\mathrm{f}'(\mathbf{J}_f) = \cos(\mathbf{J}_f) \tag{2239}$$

$$\mathrm{f}'(\mathbf{J}_f)\sin(\mathbf{J}_f) = \sin(\mathbf{J}_f)\frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{2240}$$

$$\cos(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f}\sin(\mathbf{J}_f) \tag{2241}$$

$$\frac{d}{d\mathbf{J}_f}\cos(\mathbf{J}_f) = \frac{d^2}{d\mathbf{J}_f^2}\sin(\mathbf{J}_f) \tag{2242}$$

1.4.84 Derivation 83

$$y(W,q,B) = W + \frac{q}{B} \tag{2243}$$

$$0 = W - y(W,q,B) + \frac{q}{B} \tag{2244}$$

$$\frac{d}{dq}0 = \frac{\partial}{\partial q}(W - y(W,q,B) + \frac{q}{B}) \tag{2245}$$

$$0 = -\frac{\partial}{\partial q}y(W,q,B) + \frac{1}{B} \tag{2246}$$

$$W + \frac{q}{B} = W - \frac{\partial}{\partial q}y(W,q,B) + \frac{q}{B} + \frac{1}{B} \tag{2247}$$

1.4.85 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{2248}$$

$$\mathbf{S}(Z)e^Z = e^Z \int e^Z dZ \tag{2249}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{2250}$$

$$(\hat{H}_\lambda + e^Z)e^Z = e^Z \int e^Z dZ \tag{2251}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{2252}$$

$$(\phi + e^Z)e^Z = e^Z \int e^Z dZ \tag{2253}$$

$$((\phi + e^Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{2254}$$

$$((\phi + e^Z)e^Z)^\phi = (\mathbf{S}(Z)e^Z)^\phi \tag{2255}$$

1.4.86 Derivation 85

$$\mathrm{A_x}(\varepsilon) = e^{\varepsilon} \tag{2256}$$

$$\varepsilon + \mathrm{A_x}(\varepsilon) = \varepsilon + e^{\varepsilon} \tag{2257}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \frac{d}{d\varepsilon}e^{\varepsilon} \tag{2258}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = e^{\varepsilon} \tag{2259}$$

$$\varepsilon + \mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{2260}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{2261}$$

$$\frac{d}{d\varepsilon}e^{\varepsilon} = \mathrm{A_x}(\varepsilon) \tag{2262}$$

1.4.87 Derivation 86

$$C(\phi_2) = \log(\phi_2) \tag{2263}$$

$$2C(\phi_2) = C(\phi_2) + \log(\phi_2) \tag{2264}$$

$$\frac{d}{d\phi_2}2C(\phi_2) = \frac{d}{d\phi_2}(C(\phi_2) + \log(\phi_2)) \tag{2265}$$

$$2\frac{d}{d\phi_2}C(\phi_2) = \frac{d}{d\phi_2}C(\phi_2) + \frac{1}{\phi_2} \tag{2266}$$

$$2\frac{d}{d\phi_2}\log(\phi_2) = \frac{d}{d\phi_2}\log(\phi_2) + \frac{1}{\phi_2} \tag{2267}$$

$$\phi_2 + 2\frac{d}{d\phi_2}\log(\phi_2) = \phi_2 + \frac{d}{d\phi_2}\log(\phi_2) + \frac{1}{\phi_2} \tag{2268}$$

1.4.88 Derivation 87

$$\mathrm{r_0}(\eta, g) = \int(\eta + g)dg \tag{2269}$$

$$\mathrm{r_0}(\eta, g) = \eta g + \sigma_p + \frac{g^2}{2} \tag{2270}$$

$$\int(\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} \tag{2271}$$

$$\mathrm{r_0}(\eta, g) + \int(\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} + \mathrm{r_0}(\eta, g) \tag{2272}$$

$$2\int(\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} + \int(\eta + g)dg \tag{2273}$$

1.4.89 Derivation 88

$$\mathrm{L}_{\varepsilon}(a) = \sin(a) \tag{2274}$$

$$V(a) = \frac{d}{da}\mathrm{L}_{\varepsilon}(a) \tag{2275}$$

$$V^a(a) = (\frac{d}{da}\mathrm{L}_{\varepsilon}(a))^a \tag{2276}$$

$$V^a(a) = (\frac{d}{da}\sin(a))^a \tag{2277}$$

$$(V^a(a))^a = ((\frac{d}{da}\sin(a))^a)^a \tag{2278}$$

$$(V^a(a))^a = (\cos^a(a))^a \tag{2279}$$

$$((\frac{d}{da}\mathrm{L}_{\varepsilon}(a))^a)^a = (\cos^a(a))^a \tag{2280}$$

1.4.90 Derivation 89

$$\mathrm{g}'_{\varepsilon}(\phi) = \sin(\phi) \tag{2281}$$

$$\frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) = \frac{d}{d\phi}\sin(\phi) \tag{2282}$$

$$\frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) - \frac{d}{d\phi}\sin(\phi) = 0 \tag{2283}$$

$$-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi) = 0 \tag{2284}$$

$$(-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi))^{\phi} = 0^{\phi} \tag{2285}$$

$$\cos((-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_{\varepsilon}(\phi))^{\phi}) = \cos(0^{\phi}) \tag{2286}$$

1.4.91 Derivation 90

$$\omega(\mu) = e^{\mu} \tag{2287}$$

$$1 = \frac{e^{\mu}}{\omega(\mu)} \tag{2288}$$

$$\int 1 d\mu = \int \frac{e^{\mu}}{\omega(\mu)}d\mu \tag{2289}$$

$$\mathbf{J} + \mu = \int \frac{e^{\mu}}{\omega(\mu)}d\mu \tag{2290}$$

$$\mathbf{J} + \mu - \frac{1}{\omega(\mu)} = \int \frac{e^{\mu}}{\omega(\mu)}d\mu - \frac{1}{\omega(\mu)} \tag{2291}$$

$$(\mathbf{J}+\mu)(\mathbf{J}+\mu-\frac{1}{\omega(\mu)}) = (\mathbf{J}+\mu)(\int \frac{e^{\mu}}{\omega(\mu)}d\mu - \frac{1}{\omega(\mu)}) \tag{2292}$$

1.4.92 Derivation 91

$$\mathrm{v_t}\,(q) = \int \cos{(q)}dq \tag{2293}$$

$$\mathrm{v_t}\,(q) = E + \sin{(q)} \tag{2294}$$

$$\frac{\mathrm{v_t}\,(q)}{E} = \frac{\int \cos{(q)}dq}{E} \tag{2295}$$

$$\frac{E + \sin{(q)}}{E} = \frac{\int \cos{(q)}dq}{E} \tag{2296}$$

$$\mathrm{y}'\,(q, E) = -E - \sin{(q)} + \frac{E + \sin{(q)}}{E} \tag{2297}$$

$$\int \mathrm{y}'\,(q, E)dE = \int (-E - \sin{(q)} + \frac{E + \sin{(q)}}{E})dE \tag{2298}$$

1.4.93 Derivation 92

$$\mathbf{J}(q) = \log{(q)} \tag{2299}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq}\log{(q)} \tag{2300}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{1}{q} \tag{2301}$$

$$\mathbf{v}\frac{d}{dq}\mathbf{J}(q) = \frac{\mathbf{v}}{q} \tag{2302}$$

$$\mathbf{v}\frac{d}{dq}\log{(q)} = \frac{\mathbf{v}}{q} \tag{2303}$$

$$\int \mathbf{v}\frac{d}{dq}\log{(q)}dq = \int \frac{\mathbf{v}}{q}dq \tag{2304}$$

$$\iint \mathbf{v}\frac{d}{dq}\log{(q)}dqdq = \iint \frac{\mathbf{v}}{q}dqdq \tag{2305}$$

$$(\iint \mathbf{v}\frac{d}{dq}\log{(q)}dqdq)^{q} = (\iint \frac{\mathbf{v}}{q}dqdq)^{q} \tag{2306}$$

1.4.94 Derivation 93

$$\mathbf{M}(C_2, \hat{p}) = \int (-C_2 + \hat{p})dC_2 \tag{2307}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{2308}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} \tag{2309}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{2310}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{2311}$$

$$(\int (-C_2 + \hat{p})dC_2)^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{2312}$$

1.4.95 Derivation 94

$$\mathbf{p}(E_x) = \sin{(e^{E_x})} \tag{2313}$$

$$\dot{y}(U) = \sin{(U)} \tag{2314}$$

$$\frac{d}{dU}\dot{y}(U) = \frac{d}{dU}\sin{(U)} \tag{2315}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) = \frac{d}{dE_x}\sin{(e^{E_x})} \tag{2316}$$

$$\frac{d}{dU}\dot{y}(U) = \cos{(U)} \tag{2317}$$

$$\frac{d}{dU}\sin{(U)} = \cos{(U)} \tag{2318}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) + \frac{d}{dU}\sin{(U)} = \frac{d}{dU}\sin{(U)} + \frac{d}{dE_x}\sin{(e^{E_x})} \tag{2319}$$

$$\cos{(U)} + \frac{d}{dE_x}\mathbf{p}(E_x) = e^{E_x}\cos{(e^{E_x})} + \cos{(U)} \tag{2320}$$

1.4.96 Derivation 95

$$\mathrm{v_y}\left(L\right) = e^{L} \tag{2321}$$

$$\frac{d}{dL} \mathrm{v_y}\left(L\right) = \frac{d}{dL} e^{L} \tag{2322}$$

$$2 \mathrm{v_y}\left(L\right) = \mathrm{v_y}\left(L\right) + e^{L} \tag{2323}$$

$$\frac{d^{2}}{dL^{2}} \mathrm{v_y}\left(L\right) = \frac{d^{2}}{dL^{2}} e^{L} \tag{2324}$$

$$\frac{d^{2}}{dL^{2}} \mathrm{v_y}\left(L\right) = e^{L} \tag{2325}$$

$$- L + \frac{d^{2}}{dL^{2}} \mathrm{v_y}\left(L\right) = - L + e^{L} \tag{2326}$$

1.4.97 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{2327}$$

$$\frac{\mathbf{s} \psi(\mathbf{s}, h)}{h} = 1 \tag{2328}$$

$$\frac{\mathbf{s} \psi(\mathbf{s}, h)}{h} + 1 = 2 \tag{2329}$$

$$\frac{\partial}{\partial h} \psi(\mathbf{s}, h) = \frac{\partial}{\partial h} \frac{h}{\mathbf{s}} \tag{2330}$$

$$\frac{\partial}{\partial h} \psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{2331}$$

$$\frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} = \frac{1}{\mathbf{s}^{2}} \tag{2332}$$

$$\frac{\frac{\partial}{\partial h} \frac{h}{\mathbf{s}}}{\mathbf{s}} = \frac{1}{\mathbf{s}^{2}} \tag{2333}$$

1.4.98 Derivation 97

$$\mathbf{J}_{f}(F_{g}) = e^{e^{F_{g}}} \tag{2334}$$

$$\int \mathbf{J}_{f}(F_{g}) dF_{g} = \int e^{e^{F_{g}}}\, dF_{g} \tag{2335}$$

$$\int \mathbf{J}_{f}(F_{g}) dF_{g} = h + \mathrm{Ei}\left(e^{F_{g}}\right) \tag{2336}$$

$$2 \int \mathbf{J}_{f}(F_{g}) dF_{g} = h + \mathrm{Ei}\left(e^{F_{g}}\right) + \int \mathbf{J}_{f}(F_{g}) dF_{g} \tag{2337}$$

$$h + \mathrm{Ei}\left(e^{F_{g}}\right) = \int e^{e^{F_{g}}}\, dF_{g} \tag{2338}$$

$$2 \int \mathbf{J}_{f}(F_{g}) dF_{g} = \int \mathbf{J}_{f}(F_{g}) dF_{g} + \int e^{e^{F_{g}}}\, dF_{g} \tag{2339}$$

$$2 h + 2 \mathrm{Ei}\left(e^{F_{g}}\right) = h + \mathrm{Ei}\left(e^{F_{g}}\right) + \int e^{e^{F_{g}}}\, dF_{g} \tag{2340}$$

1.4.99 Derivation 98

$$\Psi(\delta) = \log\left(\delta\right) \tag{2341}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{d}{d\delta} \log\left(\delta\right) \tag{2342}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{2343}$$

$$\frac{d}{d\delta} \log\left(\delta\right) = \frac{1}{\delta} \tag{2344}$$

$$\log\left(\delta\right) \frac{d}{d\delta} \log\left(\delta\right) = \frac{\log\left(\delta\right)}{\delta} \tag{2345}$$

1.4.100 Derivation 99

$$\mathbf{S}(G, \Omega) = G + \Omega \tag{2346}$$

$$\frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) = \frac{\partial}{\partial \Omega} (G + \Omega) \tag{2347}$$

$$\frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) = 1 \tag{2348}$$

$$(G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) = G + \Omega \tag{2349}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{2350}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \tag{2351}$$

$$- \Omega + \mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = - \Omega + (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \tag{2352}$$

1.5 Perturbation: SR

1.5.1 Derivation 0

$$\eta(a) = e^a \tag{2353}$$

$$\frac{d}{da}\eta(a) = \frac{d}{da}e^a \tag{2354}$$

$$\frac{d}{da}\eta(a) = e^a \tag{2355}$$

$$\frac{d}{da}\eta(a) = \eta(a) \tag{2356}$$

$$\eta(a)\frac{d}{da}\eta(a) = \eta^2(a) \tag{2357}$$

$$\frac{d}{da}\eta(a) = \frac{d^2}{da^2}\eta(a) \tag{2358}$$

$$\eta(a)\frac{d^2}{da^2}\eta(a) = \eta^2(a) \tag{2359}$$

1.5.2 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{2360}$$

$$\frac{d}{d\mathbf{s}}\,\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right) \tag{2361}$$

$$\frac{d}{d\mathbf{s}}\,\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{2362}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{2363}$$

1.5.3 Derivation 2

$$\mathbb{I}(\Psi_\lambda) = e^{\Psi_\lambda} \tag{2364}$$

$$\int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \int e^{\Psi_\lambda}d\Psi_\lambda \tag{2365}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \int e^{\Psi_\lambda}d\Psi_\lambda \tag{2366}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + e^{\Psi_\lambda} \tag{2367}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{2368}$$

1.5.4 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{2369}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{2370}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{2371}$$

$$\hat{x}_0\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{2372}$$

1.5.5 Derivation 4

$$\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \sin\left(P_e\right) \tag{2373}$$

$$\frac{d}{dP_e}\,\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \frac{d}{dP_e}\sin\left(P_e\right) \tag{2374}$$

$$\frac{d}{dP_e}\,\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \cos\left(P_e\right) \tag{2375}$$

$$\frac{d}{dP_e}\sin\left(P_e\right) = \cos\left(P_e\right) \tag{2376}$$

$$\frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{2377}$$

$$-1 + \frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = -1 + \frac{\cos\left(P_e\right)}{P_e} \tag{2378}$$

1.5.6 Derivation 5

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \int(\mathbf{J} + \mathbf{v})d\mathbf{J} \tag{2379}$$

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f \tag{2380}$$

$$\frac{\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right)}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \tag{2381}$$

$$\frac{\int(\mathbf{J} + \mathbf{v})d\mathbf{J}}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \tag{2382}$$

1.5.7 Derivation 6

$$\mathbf{M}(J) = \cos(J) \tag{2383}$$

$$\int \mathbf{M}(J)dJ = \int \cos(J)dJ \tag{2384}$$

$$\int \mathbf{M}(J)dJ = F_g + \sin(J) \tag{2385}$$

$$F_g + \sin(J) = \int \cos(J)dJ \tag{2386}$$

$$(F_g + \sin(J))^{F_g} = (\int \cos(J)dJ)^{F_g} \tag{2387}$$

$$2(F_g+\sin(J))^{F_g} = (F_g+\sin(J))^{F_g}+(\int \cos(J)dJ)^{F_g} \tag{2388}$$

$$\int 2(F_g+\sin(J))^{F_g}dF_g = \int((F_g+\sin(J))^{F_g}+(\int \cos(J)dJ)^{F_g})dF_g \tag{2389}$$

1.5.8 Derivation 7

$$\mathrm{C_d}(\mathbf{p}) = \sin(\mathbf{p}) \tag{2390}$$

$$\frac{d}{d\mathbf{p}} \mathrm{C_d}(\mathbf{p}) = \frac{d}{d\mathbf{p}} \sin(\mathbf{p}) \tag{2391}$$

$$F_c \frac{d}{d\mathbf{p}} \mathrm{C_d}(\mathbf{p}) = F_c \frac{d}{d\mathbf{p}} \sin(\mathbf{p}) \tag{2392}$$

$$\int F_c \frac{d}{d\mathbf{p}} \mathrm{C_d}(\mathbf{p})dF_c = \int F_c \frac{d}{d\mathbf{p}} \sin(\mathbf{p})dF_c \tag{2393}$$

$$\frac{d}{d\mathbf{p}} \mathrm{C_d}(\mathbf{p}) = \cos(\mathbf{p}) \tag{2394}$$

$$\int F_c \cos(\mathbf{p})dF_c = \int F_c \frac{d}{d\mathbf{p}} \sin(\mathbf{p})dF_c \tag{2395}$$

1.5.9 Derivation 8

$$\mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) = -\sigma_x + \varphi \tag{2396}$$

$$\frac{\partial}{\partial \varphi} \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) = \frac{\partial}{\partial \varphi}(-\sigma_x + \varphi) \tag{2397}$$

$$\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) = \frac{\partial^2}{\partial \varphi^2}(-\sigma_x + \varphi) \tag{2398}$$

$$\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) = 0 \tag{2399}$$

$$e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi)} = 1 \tag{2400}$$

$$(e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi)})^{\sigma_x} = 1 \tag{2401}$$

1.5.10 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) \tag{2402}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{2403}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{d}{d\phi}1 \tag{2404}$$

$$\frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi) = \frac{d}{d\phi}1 \tag{2405}$$

$$\frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi) = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{2406}$$

$$0 = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{2407}$$

$$0 = \frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi) \tag{2408}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi)-1 \tag{2409}$$

1.5.11 Derivation 10

$$\theta(q) = \cos(q) \tag{2410}$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos(q) \tag{2411}$$

$$\frac{d}{dq}\theta(q) = -\sin(q) \tag{2412}$$

$$-\sin(q) = \frac{d}{dq}\cos(q) \tag{2413}$$

$$(-\sin(q))^{q} = (\frac{d}{dq}\cos(q))^{q} \tag{2414}$$

$$(-\sin(q))^{2q} = (-\sin(q))^{q}(\frac{d}{dq}\cos(q))^{q} \tag{2415}$$

1.5.12 Derivation 11

$$\mathrm{r}_0(\lambda, g) = \frac{\partial}{\partial g}(\lambda + g) \tag{2416}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) = \frac{\partial^2}{\partial g^2}(\lambda + g) \tag{2417}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0(\lambda, g) = 0 \tag{2418}$$

$$\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) = \frac{d}{d\lambda}0 \tag{2419}$$

$$(\lambda + g)\frac{\partial^2}{\partial\lambda\partial g}\mathrm{r}_0(\lambda, g) = (\lambda + g)\frac{d}{d\lambda}0 \tag{2420}$$

1.5.13 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log(\mathbf{g}) \tag{2421}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log(\mathbf{g}) \tag{2422}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{2423}$$

$$\cos(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})) = \cos(\frac{1}{\mathbf{g}}) \tag{2424}$$

$$\cos(\frac{d}{d\mathbf{g}}\log(\mathbf{g})) = \cos(\frac{1}{\mathbf{g}}) \tag{2425}$$

1.5.14 Derivation 13

$$\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}}Q\mathbf{P} \tag{2426}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = \mathbf{P}\frac{\partial}{\partial \mathbf{P}}Q\mathbf{P} \tag{2427}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) = Q\mathbf{P} \tag{2428}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J)) = Q\mathbf{P} - \cos(\sin(J)) \tag{2429}$$

$$\frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}(Q, \mathbf{P}) - \cos(\sin(J))}{J} = \frac{Q\mathbf{P} - \cos(\sin(J))}{J} \tag{2430}$$

1.5.15 Derivation 14

$$\mathrm{a}^{\dagger}(u) = \cos(u) \tag{2431}$$

$$\frac{d}{du}\mathrm{a}^{\dagger}(u) = \frac{d}{du}\cos(u) \tag{2432}$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^{u} = (\frac{d}{du}\cos(u))^{u} \tag{2433}$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^{u} = (-\sin(u))^{u} \tag{2434}$$

$$(\frac{d}{du}\cos(u))^{u} = (-\sin(u))^{u} \tag{2435}$$

$$\frac{d}{du}(\frac{d}{du}\cos(u))^{u} = \frac{d}{du}(-\sin(u))^{u} \tag{2436}$$

1.5.16 Derivation 15

$$\mathrm{A}_2(\hat{H}, \mathbf{B}) = \log(\mathbf{B}^{\hat{H}}) \tag{2437}$$

$$\hat{H}_{\lambda}(y) = \cos(y) \tag{2438}$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial \hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} = \frac{\cos(y)}{\frac{\partial}{\partial \hat{H}}\mathrm{A}_2(\hat{H}, \mathbf{B})} \tag{2439}$$

$$\frac{\hat{H}_{\lambda}(y)}{\frac{\partial}{\partial \hat{H}}\log(\mathbf{B}^{\hat{H}})} = \frac{\cos(y)}{\frac{\partial}{\partial \hat{H}}\log(\mathbf{B}^{\hat{H}})} \tag{2440}$$

$$\frac{\hat{H}_{\lambda}(y)}{\log(\mathbf{B})} = \frac{\cos(y)}{\log(\mathbf{B})} \tag{2441}$$

$$(\frac{\hat{H}_{\lambda}(y)}{\log(\mathbf{B})})^{y} = (\frac{\cos(y)}{\log(\mathbf{B})})^{y} \tag{2442}$$

1.5.17 Derivation 16

$$f(C_d) = C_d \tag{2443}$$

$$\frac{d}{dC_d}f(C_d) = \frac{d}{dC_d}C_d \tag{2444}$$

$$\frac{d}{dC_d}f(C_d) = 1 \tag{2445}$$

$$1 = \frac{1}{\frac{d}{dC_d}f(C_d)} \tag{2446}$$

$$1 = \frac{1}{\frac{d}{dC_d}C_d} \tag{2447}$$

$$1 = \frac{1}{\frac{d}{df(C_d)}f(C_d)} \tag{2448}$$

1.5.18 Derivation 17

$$\hat{X}(f') = \cos(f') \tag{2449}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos(f') \tag{2450}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos(f') \tag{2451}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos(f') \tag{2452}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}(f')} = -\frac{\cos(f')}{\mathrm{P_e}(f')} \tag{2453}$$

1.5.19 Derivation 18

$$W(P_e) = \log(P_e) \tag{2454}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log(P_e) \tag{2455}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{2456}$$

$$\frac{d}{dP_e}\log(P_e) = \frac{1}{P_e} \tag{2457}$$

$$\int \frac{d}{dP_e}\log(P_e)dP_e = \int \frac{1}{P_e}dP_e \tag{2458}$$

1.5.20 Derivation 19

$$\mathrm{E}_\lambda(\hat{H}_l) = \int e^{\hat{H}_l}d\hat{H}_l \tag{2459}$$

$$0 = -\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l \tag{2460}$$

$$0 = (-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l)\int e^{\hat{H}_l}d\hat{H}_l \tag{2461}$$

$$0 = ((-\mathrm{E}_\lambda(\hat{H}_l) + \int e^{\hat{H}_l}d\hat{H}_l)^2)\int e^{\hat{H}_l}d\hat{H}_l \tag{2462}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 \tag{2463}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 \tag{2464}$$

1.5.21 Derivation 20

$$\mathrm{n}_2(V_\mathbf{B}, \mu_0) = \cos(V_\mathbf{B} + \mu_0) \tag{2465}$$

$$\int \mathrm{n}_2(V_\mathbf{B}, \mu_0)d\mu_0 = \int \cos(V_\mathbf{B} + \mu_0)d\mu_0 \tag{2466}$$

$$\int \mathrm{n}_2(V_\mathbf{B}, \mu_0)d\mu_0 = C_2 + \sin(V_\mathbf{B} + \mu_0) \tag{2467}$$

$$\int \cos(V_\mathbf{B} + \mu_0)d\mu_0 = C_2 + \sin(V_\mathbf{B} + \mu_0) \tag{2468}$$

1.5.22 Derivation 21

$$\mathrm{E_n}(S) = \int e^S dS \tag{2469}$$

$$\mathrm{E_n}(S) = x + e^S \tag{2470}$$

$$x + e^S = \int e^S dS \tag{2471}$$

$$x + e^S = T + e^S \tag{2472}$$

$$\int (x + e^S)dT = \int (T + e^S)dT \tag{2473}$$

$$\int \mathrm{E_n}\left(S\right)dT = \int (T + e^S)dT \tag{2474}$$

$$\int \mathrm{E_n}\left(S\right)dT = \frac{T^2}{2} + Te^S + \psi^* \tag{2475}$$

$$\frac{T^2}{2} + Te^S + \psi^* = \int (T + e^S)dT \tag{2476}$$

$$\frac{T^2}{2} + Te^S + \psi^* = \frac{T^2}{2} + Te^S + t_2 \tag{2477}$$

1.5.23 Derivation 22

$$\mathrm{A_x}\left(Z, \rho\right) = \frac{\partial}{\partial \rho} Z\rho \tag{2478}$$

$$\mathrm{A_x}\left(Z, \rho\right) = Z \tag{2479}$$

$$Z + \mathrm{A_x}\left(Z, \rho\right) = Z + \frac{\partial}{\partial \rho} Z\rho \tag{2480}$$

$$Z + \rho + \mathrm{A_x}\left(Z, \rho\right) = Z + \rho + \frac{\partial}{\partial \rho} Z\rho \tag{2481}$$

$$\int (Z + \rho + \mathrm{A_x}\left(Z, \rho\right))d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho \tag{2482}$$

$$\int (2Z + \rho)d\rho = \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho \tag{2483}$$

$$\frac{\partial}{\partial Z} \int (2Z + \rho)d\rho = \frac{\partial}{\partial Z} \int (Z + \rho + \frac{\partial}{\partial \rho} Z\rho)d\rho \tag{2484}$$

1.5.24 Derivation 23

$$\mathbf{p}(\phi) = \cos\left(e^\phi\right) \tag{2485}$$

$$\int \mathbf{p}(\phi)d\phi = \int \cos\left(e^\phi\right)d\phi \tag{2486}$$

$$\iint \mathbf{p}(\phi)d\phi d\phi = \iint \cos\left(e^\phi\right)d\phi d\phi \tag{2487}$$

$$\int \mathbf{p}(\phi)d\phi = \omega + \mathrm{Ci}\left(e^\phi\right) \tag{2488}$$

$$\int \cos\left(e^\phi\right)d\phi = \omega + \mathrm{Ci}\left(e^\phi\right) \tag{2489}$$

$$\iint \cos\left(e^\phi\right)d\phi d\phi = \int (\omega + \mathrm{Ci}\left(e^\phi\right))d\phi \tag{2490}$$

$$\frac{d}{d\phi} \iint \mathbf{p}(\phi)d\phi d\phi = \frac{d}{d\phi} \iint \cos\left(e^\phi\right)d\phi d\phi \tag{2491}$$

$$\frac{d}{d\phi} \iint \mathbf{p}(\phi)d\phi d\phi = \frac{\partial}{\partial \phi} \int (\omega + \mathrm{Ci}\left(e^\phi\right))d\phi \tag{2492}$$

1.5.25 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{2493}$$

$$\int y(A_x)dA_x = \int \frac{1}{A_x}dA_x \tag{2494}$$

$$\int y(A_x)dA_x = \varepsilon_0 + \log\left(A_x\right) \tag{2495}$$

$$\int \frac{1}{A_x}dA_x = \varepsilon_0 + \log\left(A_x\right) \tag{2496}$$

$$\int \frac{1}{A_x}dA_x - \frac{x}{A_x} = \varepsilon_0 + \log\left(A_x\right) - \frac{x}{A_x} \tag{2497}$$

$$\frac{\partial}{\partial x}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\varepsilon_0 + \log\left(A_x\right) - \frac{x}{A_x}) \tag{2498}$$

1.5.26 Derivation 25

$$\theta_1(g) = e^g \tag{2499}$$

$$\int \theta_1(g)dg = \int e^g dg \tag{2500}$$

$$(\int \theta_1(g)dg)^g = (\int e^g dg)^g \tag{2501}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{d}{dg}(\int e^g dg)^g \tag{2502}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \tag{2503}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{d}{dg}(\int e^g dg)^g \tag{2504}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g = \frac{d}{dg}(\int e^g dg)^g \tag{2505}$$

1.5.27 Derivation 26

$$\chi(P_e) = \cos{(P_e)} \tag{2506}$$

$$\int \chi(P_e) dP_e = \int \cos{(P_e)} dP_e \tag{2507}$$

$$\frac{d}{dP_e} \int \chi(P_e) dP_e = \frac{d}{dP_e} \int \cos{(P_e)} dP_e \tag{2508}$$

$$\frac{d}{dP_e} \int \chi(P_e) dP_e = \frac{\partial}{\partial P_e} (\psi + \sin{(P_e)}) \tag{2509}$$

$$\frac{\partial}{\partial P_e} (\psi + \sin{(P_e)}) = \frac{d}{dP_e} \int \cos{(P_e)} dP_e \tag{2510}$$

1.5.28 Derivation 27

$$\phi(x') = \int \log{(x')} dx' \tag{2511}$$

$$\frac{d}{dx'} \phi(x') = \frac{d}{dx'} \int \log{(x')} dx' \tag{2512}$$

$$\frac{d}{dx'} \phi(x') = \frac{\partial}{\partial x'} (n_2 + x' \log{(x')} - x') \tag{2513}$$

$$\mathrm{t}_1 (x', n_2) = \frac{\partial}{\partial x'} (n_2 + x' \log{(x')} - x') \tag{2514}$$

$$\mathrm{t}_1 (x', n_2) = \frac{d}{dx'} \phi(x') \tag{2515}$$

$$\mathrm{t}_1 (x', n_2) e^{-\frac{d}{dx'} \phi(x')} = e^{-\frac{d}{dx'} \phi(x')} \frac{d}{dx'} \phi(x') \tag{2516}$$

1.5.29 Derivation 28

$$f(t_1) = e^{t_1} \tag{2517}$$

$$\frac{d}{dt_1} f(t_1) = \frac{d}{dt_1} e^{t_1} \tag{2518}$$

$$\frac{d}{dt_1} f(t_1) = e^{t_1} \tag{2519}$$

$$\frac{d}{dt_1} f(t_1) = \frac{d^2}{dt_1^2} f(t_1) \tag{2520}$$

$$(\frac{d}{dt_1} f(t_1))^2 = (\frac{d^2}{dt_1^2} f(t_1))^2 \tag{2521}$$

$$(\frac{d}{dt_1} f(t_1))^4 = (\frac{d^2}{dt_1^2} f(t_1))^4 \tag{2522}$$

1.5.30 Derivation 29

$$q(c_0) = e^{c_0} \tag{2523}$$

$$\int q(c_0) dc_0 = \int e^{c_0} dc_0 \tag{2524}$$

$$e^{-c_0} \int q(c_0) dc_0 = e^{-c_0} \int e^{c_0} dc_0 \tag{2525}$$

$$e^{-c_0} \int q(c_0) dc_0 = (n + e^{c_0}) e^{-c_0} \tag{2526}$$

$$\frac{\int q(c_0) dc_0}{q(c_0)} = \frac{n + q(c_0)}{q(c_0)} \tag{2527}$$

1.5.31 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x} (-A_x + i) \tag{2528}$$

$$b^{A_x}(A_x, i) = (\frac{\partial}{\partial A_x} (-A_x + i))^{A_x} \tag{2529}$$

$$b^{A_x}(A_x, i) - (\frac{\partial}{\partial A_x} (-A_x + i))^{A_x} = 0 \tag{2530}$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \tag{2531}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{2532}$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} di = \int 0 di \tag{2533}$$

1.5.32 Derivation 31

$$A(\mathbf{P}) = \int \log{(\mathbf{P})} d\mathbf{P} \tag{2534}$$

$$A(\mathbf{P}) = \mathbf{P} \log{(\mathbf{P})} - \mathbf{P} + \theta_1 \tag{2535}$$

$$\int \log{(\mathbf{P})} d\mathbf{P} = \mathbf{P} \log{(\mathbf{P})} - \mathbf{P} + \theta_1 \tag{2536}$$

$$(\int \log{(\mathbf{P})} d\mathbf{P})^{\theta_1} = (\mathbf{P} \log{(\mathbf{P})} - \mathbf{P} + \theta_1)^{\theta_1} \tag{2537}$$

$$(\int \log{(\mathbf{P})} d\mathbf{P})^{\theta_1} = A^{\theta_1}(\mathbf{P}) \tag{2538}$$

$$A^{\theta_1}(\mathbf{P}) = (\mathbf{P}\log{(\mathbf{P})} - \mathbf{P} + \theta_1)^{\theta_1} \tag{2539}$$

$$\frac{\partial}{\partial\theta_1}A^{\theta_1}(\mathbf{P}) = \frac{\partial}{\partial\theta_1}(\mathbf{P}\log{(\mathbf{P})} - \mathbf{P} + \theta_1)^{\theta_1} \tag{2540}$$

1.5.33 Derivation 32

$$\mathrm{P_e}\left(\dot{z}\right) = \sin{(\dot{z})} \tag{2541}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\left(\dot{z}\right) = \frac{d}{d\dot{z}}\sin{(\dot{z})} \tag{2542}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\left(\dot{z}\right) = \cos{(\dot{z})} \tag{2543}$$

$$\sin{(\dot{z})}\frac{d}{d\dot{z}}\,\mathrm{P_e}\left(\dot{z}\right) = \sin{(\dot{z})}\cos{(\dot{z})} \tag{2544}$$

$$\mathrm{P_e}\left(\dot{z}\right)\frac{d}{d\dot{z}}\,\mathrm{P_e}\left(\dot{z}\right) = \mathrm{P_e}\left(\dot{z}\right)\cos{(\dot{z})} \tag{2545}$$

1.5.34 Derivation 33

$$\mathbf{J}(\mathbf{A}) = \sin{(e^{\mathbf{A}})} \tag{2546}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = \frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} \tag{2547}$$

$$\frac{d}{d\mathbf{A}}\mathbf{J}(\mathbf{A}) = e^{\mathbf{A}}\cos{(e^{\mathbf{A}})} \tag{2548}$$

$$\frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} = e^{\mathbf{A}}\cos{(e^{\mathbf{A}})} \tag{2549}$$

$$e^{-\mathbf{A}}\frac{d}{d\mathbf{A}}\sin{(e^{\mathbf{A}})} = \cos{(e^{\mathbf{A}})} \tag{2550}$$

1.5.35 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{2551}$$

$$\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial\mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{2552}$$

$$\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{2553}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \tag{2554}$$

1.5.36 Derivation 35

$$\lambda(V) = V \tag{2555}$$

$$1 = \frac{V}{\lambda(V)} \tag{2556}$$

$$\frac{d}{dV}1 = \frac{d}{dV}\frac{V}{\lambda(V)} \tag{2557}$$

$$\frac{d}{dV}1 - \frac{d}{dV}\frac{V}{\lambda(V)} = 0 \tag{2558}$$

$$\frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} = 0 \tag{2559}$$

$$\frac{\frac{d}{dV}V}{V} - \frac{1}{V} = 0 \tag{2560}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} = 0 \tag{2561}$$

1.5.37 Derivation 36

$$\mathrm{f}'\left(\dot{z}, V, A\right) = A + V - \dot{z} \tag{2562}$$

$$\int \mathrm{f}'\left(\dot{z}, V, A\right) dV = \int (A + V - \dot{z}) dV \tag{2563}$$

$$\int \mathrm{f}'\left(\dot{z}, V, A\right) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{2564}$$

$$\int (A + V - \dot{z}) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{2565}$$

1.5.38 Derivation 37

$$\mathrm{A_x}\left(\mathbf{S}\right) = e^{\mathbf{S}} \tag{2566}$$

$$\mathrm{A_x}\left(\mathbf{S}\right) + e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{2567}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}\left(\mathbf{S}\right) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}2e^{\mathbf{S}} \tag{2568}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\,\mathrm{A_x}\left(\mathbf{S}\right) = 2e^{\mathbf{S}} \tag{2569}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}\left(\mathbf{S}\right) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\,\mathrm{A_x}\left(\mathbf{S}\right)) \tag{2570}$$

1.5.39 Derivation 38

$$J(\phi_1) = \sin(\phi_1) \tag{2571}$$

$$\frac{d}{d\phi_1}J(\phi_1) = \frac{d}{d\phi_1}\sin(\phi_1) \tag{2572}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) \tag{2573}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) \tag{2574}$$

$$\sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) = \sin(\phi_1)\cos(\phi_1) \tag{2575}$$

$$J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = J(\phi_1)\cos(\phi_1) \tag{2576}$$

1.5.40 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{2577}$$

$$\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} = \int(\mathbf{A} + \varepsilon_0)d\mathbf{A} \tag{2578}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int(\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{2579}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{2580}$$

$$(\int(\mathbf{A}+\varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{2581}$$

1.5.41 Derivation 40

$$\hat{p}(k, \hat{H}_\lambda) = \frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} \tag{2582}$$

$$\hat{p}(k, \hat{H}_\lambda) - \frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} = 0 \tag{2583}$$

$$\hat{p}(k, \hat{H}_\lambda) = \frac{1}{k} \tag{2584}$$

$$-\frac{\partial}{\partial \hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} + \frac{1}{k} = 0 \tag{2585}$$

1.5.42 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^\pi} \tag{2586}$$

$$\int \mathrm{F_x}(\pi)d\pi = \int e^{e^\pi}d\pi \tag{2587}$$

$$\int \mathrm{F_x}(\pi)d\pi = P_g + \mathrm{Ei}(e^\pi) \tag{2588}$$

$$0 = -\int \mathrm{F_x}(\pi)d\pi + \int e^{e^\pi}d\pi \tag{2589}$$

$$0 = F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi)d\pi \tag{2590}$$

$$0 = F_g - P_g \tag{2591}$$

1.5.43 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c\cos(\lambda) \tag{2592}$$

$$\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c) = \frac{\partial}{\partial c}c\cos(\lambda) \tag{2593}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^\lambda = (\frac{\partial}{\partial c}c\cos(\lambda))^\lambda \tag{2594}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^\lambda = \cos^\lambda(\lambda) \tag{2595}$$

$$\cos^\lambda(\lambda) = (\frac{\partial}{\partial c}c\cos(\lambda))^\lambda \tag{2596}$$

1.5.44 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{2597}$$

$$G(\nabla) + \int \cos(\nabla)d\nabla = \cos(\nabla) + \int \cos(\nabla)d\nabla \tag{2598}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{2599}$$

$$\int(\varphi + G(\nabla) + \sin(\nabla))d\nabla = \int(\varphi + \sin(\nabla) + \cos(\nabla))d\nabla \tag{2600}$$

$$-G(\nabla) + \int(\varphi + G(\nabla) + \sin(\nabla))d\nabla - \int \cos(\nabla)d\nabla = -G(\nabla) + \tag{2601}$$

1.5.45 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{2602}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{2603}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{2604}$$

$$(f^*\nabla(f^*, \pi))^{f^*} = (f^*)^{f^*} \tag{2605}$$

$$f^*\nabla(f^*, \pi)+(f^*\nabla(f^*, \pi))^{f^*} = f^*\nabla(f^*, \pi)+(f^*)^{f^*} \tag{2606}$$

$$f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*} = f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*)^{f^*} \tag{2607}$$

1.5.46 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{2608}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{2609}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = -\frac{F_x}{\mathbf{r}^2} \tag{2610}$$

$$\frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}^2} \tag{2611}$$

$$-F_x + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -F_x - \frac{F_x}{\mathbf{r}^2} \tag{2612}$$

1.5.47 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{2613}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{2614}$$

$$\int u(\lambda)d\lambda = n - \cos(\lambda) \tag{2615}$$

$$\int \sin(\lambda)d\lambda = n - \cos(\lambda) \tag{2616}$$

$$-\frac{\int \sin(\lambda)d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{2617}$$

1.5.48 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{2618}$$

$$\phi_1 \mathrm{f}'(\phi_1) = \phi_1^2 \tag{2619}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \int \phi_1^2 d\phi_1 \tag{2620}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{2621}$$

$$\int \phi_1^2 d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{2622}$$

$$\frac{\phi_1^3}{3} + n_2 = \hbar + \frac{\phi_1^3}{3} \tag{2623}$$

1.5.49 Derivation 48

$$\mathrm{a}^\dagger(\omega) = \int \log(\omega)d\omega \tag{2624}$$

$$\mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega + \rho \tag{2625}$$

$$-\rho + \mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega \tag{2626}$$

$$(-\rho + \mathrm{a}^\dagger(\omega))^\omega = (\omega\log(\omega) - \omega)^\omega \tag{2627}$$

$$\frac{\partial}{\partial \rho}(-\rho+\mathrm{a}^\dagger(\omega))^\omega = \frac{d}{d\rho}(\omega\log(\omega)-\omega)^\omega \tag{2628}$$

1.5.50 Derivation 49

$$\hat{x}(f) = \int \log(f)df \tag{2629}$$

$$\hat{x}(f) = B + f\log(f) - f \tag{2630}$$

$$B + f\log(f) - f = \int \log(f)df \tag{2631}$$

$$B + f\log(f) = f + \int \log(f)df \tag{2632}$$

1.5.51 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{2633}$$

$$\int \mathbf{v}(C_2) dC_2 = \int C_2 dC_2 \tag{2634}$$

$$\int \mathbf{v}(C_2) dC_2 = \frac{C_2^2}{2} + v \tag{2635}$$

$$\int \mathbf{v}(C_2) d\mathbf{v}(C_2) = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{2636}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{2637}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{2638}$$

1.5.52 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{2639}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log(\mathbf{s}) d\mathbf{s} \tag{2640}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s}\log(\mathbf{s}) - \mathbf{s} + \omega \tag{2641}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{2642}$$

$$a(\mathbf{s}) = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{2643}$$

1.5.53 Derivation 52

$$\mathrm{v_t}(t, \hat{X}) = \hat{X}^t \tag{2644}$$

$$\frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \frac{\partial}{\partial t}\hat{X}^t \tag{2645}$$

$$\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \hat{X} + \frac{\partial}{\partial t}\hat{X}^t \tag{2646}$$

$$\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \hat{X} + \hat{X}^t\log(\hat{X}) \tag{2647}$$

$$\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \hat{X} + \mathrm{v_t}(t, \hat{X})\log(\hat{X}) \tag{2648}$$

$$\hat{X} + \frac{\partial}{\partial t}\hat{X}^t = \hat{X} + \hat{X}^t\log(\hat{X}) \tag{2649}$$

1.5.54 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{2650}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \frac{d}{dA}e^A \tag{2651}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = (\frac{d}{dA}e^A)^A \tag{2652}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = (e^A)^A \tag{2653}$$

$$(\frac{d}{dA}e^A)^A = (e^A)^A \tag{2654}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = \mathrm{A_y}^A(A) \tag{2655}$$

1.5.55 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{2656}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{2657}$$

$$\frac{\partial}{\partial \mathbf{P}}\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}^2} \tag{2658}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{2659}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{2660}$$

1.5.56 Derivation 55

$$x(C_d) = \log(C_d) \tag{2661}$$

$$x^{C_d}(C_d) = \log(C_d)^{C_d} \tag{2662}$$

$$\frac{d}{dC_d}x^{C_d}(C_d) = \frac{d}{dC_d}\log(C_d)^{C_d} \tag{2663}$$

$$(\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log(x(C_d)))x^{C_d}(C_d) = (\log(\log(C_d)) + \frac{1}{\log(C_d \tag{2664}$$

$$(\frac{C_d\frac{d}{dC_d}x(C_d)}{x(C_d)} + \log(x(C_d)))\log(C_d)^{C_d} = (\log(\log(C_d)) + \frac{1}{\log(\tag{2665}$$

1.5.57 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{2666}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \frac{d}{d\psi^*}\sin(\psi^*) \tag{2667}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \cos(\psi^*) \tag{2668}$$

$$C(\psi^*) + \frac{d}{d\psi^*}\sin(\psi^*) = \sin(\psi^*) + \frac{d}{d\psi^*}\sin(\psi^*) \tag{2669}$$

$$C(\psi^*) + \frac{d}{d\psi^*}C(\psi^*) = \sin(\psi^*) + \frac{d}{d\psi^*}C(\psi^*) \tag{2670}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{2671}$$

1.5.58 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{2672}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{2673}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{2674}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{2675}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{2676}$$

1.5.59 Derivation 58

$$\mathrm{E_x}(t_2) = \frac{1}{t_2} \tag{2677}$$

$$\int \mathrm{E_x}(t_2)dt_2 = \int \frac{1}{t_2}dt_2 \tag{2678}$$

$$(\int \mathrm{E_x}(t_2)dt_2)^{t_2} = (\int \frac{1}{t_2}dt_2)^{t_2} \tag{2679}$$

$$\int \mathrm{E_x}(t_2)dt_2 = C_1 + \log(t_2) \tag{2680}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \frac{1}{t_2}dt_2)^{t_2} \tag{2681}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \mathrm{E_x}(t_2)dt_2)^{t_2} \tag{2682}$$

1.5.60 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{2683}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*}\log(\psi^*) \tag{2684}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) = \frac{1}{\psi^*} \tag{2685}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\log(\psi^*) \tag{2686}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*} \tag{2687}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*} \tag{2688}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} \tag{2689}$$

1.5.61 Derivation 60

$$H(u) = e^u \tag{2690}$$

$$1 = \frac{e^u}{H(u)} \tag{2691}$$

$$\int 1du = \int \frac{e^u}{H(u)}du \tag{2692}$$

$$A_x + u = \int \frac{e^u}{H(u)}du \tag{2693}$$

$$-A_x - u = -\int \frac{e^u}{H(u)}du \tag{2694}$$

1.5.62 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{2695}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{2696}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = 0 \tag{2697}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{2698}$$

1.5.63 Derivation 62

$$\tilde{g}(\dot{y}, J_\varepsilon) = -J_\varepsilon + \dot{y} \tag{2699}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{2700}$$

$$\frac{\partial}{\partial J_\varepsilon}\tilde{g}(\dot{y}, J_\varepsilon) = -1 \tag{2701}$$

$$-1 = \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) \tag{2702}$$

$$\int (-1) dJ_\varepsilon = \int \frac{\partial}{\partial J_\varepsilon}(-J_\varepsilon + \dot{y}) dJ_\varepsilon \tag{2703}$$

1.5.64 Derivation 63

$$\mathrm{A_x}\left(W, \chi\right) = \log\left(\chi^W\right) \tag{2704}$$

$$\int \mathrm{A_x}\left(W, \chi\right) dW = \int \log\left(\chi^W\right) dW \tag{2705}$$

$$\int \mathrm{A_x}\left(W, \chi\right) dW = M + \frac{W^2 \log\left(\chi\right)}{2} \tag{2706}$$

$$\int \log\left(\chi^W\right) dW = M + \frac{W^2 \log\left(\chi\right)}{2} \tag{2707}$$

$$-(e^\chi)^\chi + \int \log\left(\chi^W\right) dW = M + \frac{W^2 \log\left(\chi\right)}{2} - (e^\chi)^\chi \tag{2708}$$

1.5.65 Derivation 64

$$\delta(q) = \log\left(q\right) \tag{2709}$$

$$\int \delta(q) dq = \int \log\left(q\right) dq \tag{2710}$$

$$0 = -\int \delta(q) dq + \int \log\left(q\right) dq \tag{2711}$$

$$0 = A_2 + q \log\left(q\right) - q - \int \delta(q) dq \tag{2712}$$

$$0 = A_2 + q\delta(q) - q - \int \delta(q) dq \tag{2713}$$

$$0 = A_2 + q\delta(q) - q - \int \log\left(q\right) dq \tag{2714}$$

$$0 = A_2 - m_s + q\delta(q) - q \log\left(q\right) \tag{2715}$$

$$\frac{d}{dA_2}0 = \frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q \log\left(q\right)) \tag{2716}$$

1.5.66 Derivation 65

$$\mathrm{A_y}\left(\phi_2\right) = \cos\left(\phi_2\right) \tag{2717}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) = \frac{d}{d\phi_2}\cos\left(\phi_2\right) \tag{2718}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) = -\sin\left(\phi_2\right) \tag{2719}$$

$$\frac{d}{d\phi_2}\cos\left(\phi_2\right) = -\sin\left(\phi_2\right) \tag{2720}$$

$$\frac{d^2}{d\phi_2^2}\cos\left(\phi_2\right) = \frac{d}{d\phi_2} - \sin\left(\phi_2\right) \tag{2721}$$

$$\frac{d^3}{d\phi_2^3}\cos\left(\phi_2\right) = \frac{d^2}{d\phi_2^2} - \sin\left(\phi_2\right) \tag{2722}$$

1.5.67 Derivation 66

$$\mathbf{g}(Q) = \sin\left(e^Q\right) \tag{2723}$$

$$\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ}\sin\left(e^Q\right) \tag{2724}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = \frac{d}{dQ}\mathbf{g}(Q) + \frac{d}{dQ}\sin\left(e^Q\right) \tag{2725}$$

$$2\frac{d}{dQ}\mathbf{g}(Q) = e^Q \cos\left(e^Q\right) + \frac{d}{dQ}\mathbf{g}(Q) \tag{2726}$$

$$\int 2\frac{d}{dQ}\mathbf{g}(Q) dQ = \int (e^Q \cos\left(e^Q\right) + \frac{d}{dQ}\mathbf{g}(Q)) dQ \tag{2727}$$

1.5.68 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{2728}$$

$$l(\varphi^*) - 1 = \frac{d}{d\varphi^*}e^{\varphi^*} - 1 \tag{2729}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{2730}$$

$$e^{\varphi^*} = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{2731}$$

$$l(\varphi^*) - 1 = \frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 \tag{2732}$$

1.5.69 Derivation 68

$$l(M_E) = \cos(M_E) \tag{2733}$$

$$\frac{d}{dM_E}l(M_E) = \frac{d}{dM_E}\cos(M_E) \tag{2734}$$

$$\frac{d}{dM_E}l(M_E) - \frac{d}{dM_E}\cos(M_E) = 0 \tag{2735}$$

$$\sin(M_E) + \frac{d}{dM_E}l(M_E) = 0 \tag{2736}$$

$$\sin(M_E) + \frac{d}{dM_E}\cos(M_E) = 0 \tag{2737}$$

$$\int(\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E = \int 0 dM_E \tag{2738}$$

$$\int(\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E - 1 = \int 0 dM_E - 1 \tag{2739}$$

$$y' - 1 = \int 0 dM_E - 1 \tag{2740}$$

$$y' - 1 = \int(\sin(M_E) + \frac{d}{dM_E}\cos(M_E))dM_E - 1 \tag{2741}$$

1.5.70 Derivation 69

$$\hat{\mathbf{x}}(C_2) = \sin(C_2) \tag{2742}$$

$$\frac{d}{dC_2}\hat{\mathbf{x}}(C_2) = \frac{d}{dC_2}\sin(C_2) \tag{2743}$$

$$\int \frac{d}{dC_2}\hat{\mathbf{x}}(C_2)dC_2 = \int \frac{d}{dC_2}\sin(C_2)dC_2 \tag{2744}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \sin(C_2) \tag{2745}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \hat{\mathbf{x}}(C_2) \tag{2746}$$

$$c + \sin(C_2) = \varepsilon + \sin(C_2) \tag{2747}$$

$$\varepsilon + c + 2\sin(C_2) = 2\varepsilon + 2\sin(C_2) \tag{2748}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) \tag{2749}$$

1.5.71 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos(U) \tag{2750}$$

$$\hat{\mathbf{r}}^2(U) = \hat{\mathbf{r}}(U)\cos(U) \tag{2751}$$

$$1 = \frac{\cos(U)}{\hat{\mathbf{r}}(U)} \tag{2752}$$

$$\hat{\mathbf{r}}(U)\cos(U) = \cos^2(U) \tag{2753}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2(U) \tag{2754}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \int \cos^2(U)dU \tag{2755}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} \tag{2756}$$

$$\frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} = \int \cos^2(U)dU \tag{2757}$$

1.5.72 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{2758}$$

$$L + \mathrm{v_x}(G, L) = G \tag{2759}$$

$$\frac{\partial}{\partial G}(L + \mathrm{v_x}(G, L)) = \frac{d}{dG}G \tag{2760}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = 1 \tag{2761}$$

$$(\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G = 1 \tag{2762}$$

$$((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G = 1 \tag{2763}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = 1 \tag{2764}$$

1.5.73 Derivation 72

$$\mathrm{A_1}(\theta_1) = \cos(\theta_1) \tag{2765}$$

$$\mathrm{A_1}(\theta_1)\cos(\theta_1) = \cos^2(\theta_1) \tag{2766}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1)d\theta_1 = \int \cos^2(\theta_1)d\theta_1 \tag{2767}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1)d\theta_1 = \frac{\theta_1}{2}+t_2+\frac{\sin(\theta_1)\cos(\theta_1)}{2} \tag{2768}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} = \int \cos^2(\theta_1)d\theta_1 \tag{2769}$$

1.5.74 Derivation 73

$$\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon\mathbf{J}_M \tag{2770}$$

$$-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon\mathbf{J}_M - J_\varepsilon \tag{2771}$$

$$\frac{\partial}{\partial \mathbf{J}_M}(-J_\varepsilon + \mathbf{g}(J_\varepsilon, \mathbf{J}_M)) = \frac{\partial}{\partial \mathbf{J}_M}(J_\varepsilon\mathbf{J}_M - J_\varepsilon) \tag{2772}$$

$$\frac{\partial}{\partial \mathbf{J}_M}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = J_\varepsilon \tag{2773}$$

$$\frac{\partial^2}{\partial \mathbf{J}_M^2}\mathbf{g}(J_\varepsilon, \mathbf{J}_M) = \frac{d}{d\mathbf{J}_M}J_\varepsilon \tag{2774}$$

1.5.75 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{2775}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{2776}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{2777}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} \tag{2778}$$

1.5.76 Derivation 75

$$\mathrm{A_z}(F_N) = \sin(F_N) \tag{2779}$$

$$\int \mathrm{A_z}(F_N)dF_N = \int \sin(F_N)dF_N \tag{2780}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}(F_N)dF_N)^2 \tag{2781}$$

$$\mathbf{v}(F_N) = (\int \sin(F_N)dF_N)^2 \tag{2782}$$

$$\mathbf{v}(F_N) = (Q - \cos(F_N))^2 \tag{2783}$$

$$(\int \mathrm{A_z}(F_N)dF_N)^2 = (\int \sin(F_N)dF_N)^2 \tag{2784}$$

$$(\int \mathrm{A_z}(F_N)dF_N)^2 = (Q - \cos(F_N))^2 \tag{2785}$$

$$(\int \sin(F_N)dF_N)^2 = (Q - \cos(F_N))^2 \tag{2786}$$

1.5.77 Derivation 76

$$r(\hat{X}) = \sin(\hat{X}) \tag{2787}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin(\hat{X}) \tag{2788}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos(\hat{X}) \tag{2789}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = \frac{d}{d\hat{X}}\cos(\hat{X}) \tag{2790}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin(\hat{X}) \tag{2791}$$

1.5.78 Derivation 77

$$A(\dot{z}) = e^{\sin{(\dot{z})}} \tag{2792}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = \frac{d}{d\dot{z}}e^{\sin{(\dot{z})}} \tag{2793}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{2794}$$

$$-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z}) = -A(\dot{z}) + e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{2795}$$

$$e^{-A(\dot{z})+\frac{d}{d\dot{z}}A(\dot{z})} = e^{-A(\dot{z})+e^{\sin{(\dot{z})}}\cos{(\dot{z})}} \tag{2796}$$

$$(e^{-A(\dot{z})+\frac{d}{d\dot{z}}A(\dot{z})})^{\dot{z}} = (e^{-A(\dot{z})+e^{\sin{(\dot{z})}}\cos{(\dot{z})}})^{\dot{z}} \tag{2797}$$

1.5.79 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{2798}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon = \int \cos{(L_\varepsilon)}dL_\varepsilon \tag{2799}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \int \cos{(L_\varepsilon)}dL_\varepsilon + 1 \tag{2800}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{2801}$$

$$\int \cos{(L_\varepsilon)}dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{2802}$$

$$(\int \cos{(L_\varepsilon)}dL_\varepsilon + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{2803}$$

$$(r_0+\sin{(L_\varepsilon)}+1)^\pi = (\pi+\sin{(L_\varepsilon)}+1)^\pi \tag{2804}$$

1.5.80 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin{(\varepsilon_0)} \tag{2805}$$

$$0 = -\mathrm{f}'(\varepsilon_0) + \sin{(\varepsilon_0)} \tag{2806}$$

$$\frac{d}{d\varepsilon_0}0 = \frac{d}{d\varepsilon_0}(-\mathrm{f}'(\varepsilon_0) + \sin{(\varepsilon_0)}) \tag{2807}$$

$$0 = \cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{2808}$$

$$\int 0 d\varepsilon_0 = \int (\cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0))d\varepsilon_0 \tag{2809}$$

1.5.81 Derivation 80

$$S(Q, \mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{2810}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{2811}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{2812}$$

$$\int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{2813}$$

$$0 = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} \tag{2814}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{2815}$$

$$0 = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} \tag{2816}$$

1.5.82 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin{(\hat{H}_l)}d\hat{H}_l \tag{2817}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos{(\hat{H}_l)} \tag{2818}$$

$$V - \cos{(\hat{H}_l)} = \int \sin{(\hat{H}_l)}d\hat{H}_l \tag{2819}$$

$$-\mathbf{F}(\hat{H}_l) = -\int \sin{(\hat{H}_l)}d\hat{H}_l \tag{2820}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos{(\hat{H}_l)} \tag{2821}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos{(\hat{H}_l)} \tag{2822}$$

$$-V + \cos{(\hat{H}_l)} = -C + \cos{(\hat{H}_l)} \tag{2823}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-C + \cos{(\hat{H}_l)})^C \tag{2824}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos{(\hat{H}_l)})^C \tag{2825}$$

1.5.83 Derivation 82

$$\mathrm{f}'\left(\mathbf{J}_f\right) = \frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) \tag{2826}$$

$$\mathrm{f}'\left(\mathbf{J}_f\right) = \cos\left(\mathbf{J}_f\right) \tag{2827}$$

$$\mathrm{f}'\left(\mathbf{J}_f\right)\sin\left(\mathbf{J}_f\right) = \sin\left(\mathbf{J}_f\right)\frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) \tag{2828}$$

$$\cos\left(\mathbf{J}_f\right) = \frac{d}{d\mathbf{J}_f}\sin\left(\mathbf{J}_f\right) \tag{2829}$$

$$\mathrm{f}'\left(\mathbf{J}_f\right)\sin\left(\mathbf{J}_f\right) = \sin\left(\mathbf{J}_f\right)\cos\left(\mathbf{J}_f\right) \tag{2830}$$

1.5.84 Derivation 83

$$y(W, q, B) = W + \frac{q}{B} \tag{2831}$$

$$0 = W - y(W, q, B) + \frac{q}{B} \tag{2832}$$

$$\frac{d}{dq}0 = \frac{\partial}{\partial q}(W - y(W, q, B) + \frac{q}{B}) \tag{2833}$$

$$0 = -\frac{\partial}{\partial q}y(W, q, B) + \frac{1}{B} \tag{2834}$$

$$0 = -\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} \tag{2835}$$

1.5.85 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{2836}$$

$$\mathbf{S}(Z)e^Z = e^Z \int e^Z dZ \tag{2837}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{2838}$$

$$(\hat{H}_\lambda + e^Z)e^Z = e^Z \int e^Z dZ \tag{2839}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{2840}$$

$$(\phi + e^Z)e^Z = e^Z \int e^Z dZ \tag{2841}$$

$$((\phi + e^Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{2842}$$

$$e^{((\phi+e^Z)e^Z)^\phi} = e^{(e^Z \int e^Z dZ)^\phi} \tag{2843}$$

1.5.86 Derivation 85

$$\mathrm{A_x}\left(\varepsilon\right) = e^\varepsilon \tag{2844}$$

$$\varepsilon + \mathrm{A_x}\left(\varepsilon\right) = \varepsilon + e^\varepsilon \tag{2845}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) = \frac{d}{d\varepsilon}e^\varepsilon \tag{2846}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) = e^\varepsilon \tag{2847}$$

$$\varepsilon + \mathrm{A_x}\left(\varepsilon\right) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) \tag{2848}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) = \mathrm{A_x}\left(\varepsilon\right) \tag{2849}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}\left(\varepsilon\right) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}\left(\varepsilon\right) \tag{2850}$$

1.5.87 Derivation 86

$$C(\phi_2) = \log\left(\phi_2\right) \tag{2851}$$

$$2C(\phi_2) = C(\phi_2) + \log\left(\phi_2\right) \tag{2852}$$

$$\frac{d}{d\phi_2}2C(\phi_2) = \frac{d}{d\phi_2}(C(\phi_2) + \log\left(\phi_2\right)) \tag{2853}$$

$$2\frac{d}{d\phi_2}C(\phi_2) = \frac{d}{d\phi_2}C(\phi_2) + \frac{1}{\phi_2} \tag{2854}$$

$$2\frac{d}{d\phi_2}\log\left(\phi_2\right) = \frac{d}{d\phi_2}\log\left(\phi_2\right) + \frac{1}{\phi_2} \tag{2855}$$

$$4(\frac{d}{d\phi_2}\log\left(\phi_2\right))^2 = (\frac{d}{d\phi_2}\log\left(\phi_2\right) + \frac{1}{\phi_2})^2 \tag{2856}$$

1.5.88 Derivation 87

$$\mathrm{r}_0\left(\eta, g\right) = \int(\eta + g)dg \tag{2857}$$

$$\mathrm{r}_0\left(\eta, g\right) = \eta g + \sigma_p + \frac{g^2}{2} \tag{2858}$$

$$\int(\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} \tag{2859}$$

$$\mathrm{r}_0\left(\eta, g\right)+\int(\eta+g)dg=\eta g+\sigma_p+\frac{g^2}{2}+\mathrm{r}_0\left(\eta, g\right) \tag{2860}$$

$$\eta g+\sigma_p+\frac{g^2}{2}+\int(\eta+g)dg=2\eta g+2\sigma_p+g^2 \tag{2861}$$

1.5.89 Derivation 88

$$\mathrm{L}_{\varepsilon}\left(a\right)=\sin\left(a\right) \tag{2862}$$

$$V(a)=\frac{d}{da}\,\mathrm{L}_{\varepsilon}\left(a\right) \tag{2863}$$

$$V^a(a)=(\frac{d}{da}\,\mathrm{L}_{\varepsilon}\left(a\right))^a \tag{2864}$$

$$V^a(a)=(\frac{d}{da}\sin\left(a\right))^a \tag{2865}$$

$$(V^a(a))^a=((\frac{d}{da}\sin\left(a\right))^a)^a \tag{2866}$$

$$(V^a(a))^a=(\cos^a\left(a\right))^a \tag{2867}$$

$$(V^a(a))^a+(\frac{d}{da}\,\mathrm{L}_{\varepsilon}\left(a\right))^a=(\cos^a\left(a\right))^a+(\frac{d}{da}\,\mathrm{L}_{\varepsilon}\left(a\right))^a \tag{2868}$$

1.5.90 Derivation 89

$$\mathrm{g}_{\varepsilon}'\left(\phi\right)=\sin\left(\phi\right) \tag{2869}$$

$$\frac{d}{d\phi}\,\mathrm{g}_{\varepsilon}'\left(\phi\right)=\frac{d}{d\phi}\sin\left(\phi\right) \tag{2870}$$

$$\frac{d}{d\phi}\,\mathrm{g}_{\varepsilon}'\left(\phi\right)-\frac{d}{d\phi}\sin\left(\phi\right)=0 \tag{2871}$$

$$-\cos\left(\phi\right)+\frac{d}{d\phi}\,\mathrm{g}_{\varepsilon}'\left(\phi\right)=0 \tag{2872}$$

$$(-\cos\left(\phi\right)+\frac{d}{d\phi}\,\mathrm{g}_{\varepsilon}'\left(\phi\right))^{\phi}=0^{\phi} \tag{2873}$$

$$\frac{(-\cos\left(\phi\right)+\frac{d}{d\phi}\,\mathrm{g}_{\varepsilon}'\left(\phi\right))^{\phi}}{-\cos\left(\phi\right)+\frac{d}{d\phi}\sin\left(\phi\right)}=\frac{0^{\phi}}{-\cos\left(\phi\right)+\frac{d}{d\phi}\sin\left(\phi\right)} \tag{2874}$$

1.5.91 Derivation 90

$$\omega(\mu)=e^{\mu} \tag{2875}$$

$$1=\frac{e^{\mu}}{\omega(\mu)} \tag{2876}$$

$$\int 1d\mu=\int\frac{e^{\mu}}{\omega(\mu)}d\mu \tag{2877}$$

$$\mathbf{J}+\mu=\int\frac{e^{\mu}}{\omega(\mu)}d\mu \tag{2878}$$

$$\mathbf{J}+\mu-\frac{1}{\omega(\mu)}=\int\frac{e^{\mu}}{\omega(\mu)}d\mu-\frac{1}{\omega(\mu)} \tag{2879}$$

$$\mathbf{J}+\mu+\frac{e^{\mu}}{\omega(\mu)}-\frac{1}{\omega(\mu)}=\int\frac{e^{\mu}}{\omega(\mu)}d\mu+\frac{e^{\mu}}{\omega(\mu)}-\frac{1}{\omega(\mu)} \tag{2880}$$

1.5.92 Derivation 91

$$\mathrm{v_t}\left(q\right)=\int\cos\left(q\right)dq \tag{2881}$$

$$\mathrm{v_t}\left(q\right)=E+\sin\left(q\right) \tag{2882}$$

$$\frac{\mathrm{v_t}\left(q\right)}{E}=\frac{\int\cos\left(q\right)dq}{E} \tag{2883}$$

$$\frac{E+\sin\left(q\right)}{E}=\frac{\int\cos\left(q\right)dq}{E} \tag{2884}$$

$$\mathrm{y}'\left(q, E\right)=-E-\sin\left(q\right)+\frac{E+\sin\left(q\right)}{E} \tag{2885}$$

$$\mathrm{y}'\left(q, E\right)=-E-\sin\left(q\right)+\frac{\int\cos\left(q\right)dq}{E} \tag{2886}$$

1.5.93 Derivation 92

$$\mathbf{J}(q)=\log\left(q\right) \tag{2887}$$

$$\frac{d}{dq}\mathbf{J}(q)=\frac{d}{dq}\log\left(q\right) \tag{2888}$$

$$\frac{d}{dq}\mathbf{J}(q)=\frac{1}{q} \tag{2889}$$

$$\mathbf{v}\frac{d}{dq}\mathbf{J}(q)=\frac{\mathbf{v}}{q} \tag{2890}$$

$$\mathbf{v}\frac{d}{dq}\log\left(q\right)=\frac{\mathbf{v}}{q} \tag{2891}$$

$$\int \mathbf{v}\frac{d}{dq}\log{(q)}dq = \int \frac{\mathbf{v}}{q}dq \tag{2892}$$

$$\iint \mathbf{v}\frac{d}{dq}\log{(q)}dqdq = \iint \frac{\mathbf{v}}{q}dqdq \tag{2893}$$

$$\frac{\iint \mathbf{v}\frac{d}{dq}\log{(q)}dqdq}{\log{(q)}} = \frac{\iint \frac{\mathbf{v}}{q}dqdq}{\log{(q)}} \tag{2894}$$

1.5.94 Derivation 93

$$\mathbf{M}(C_2, \hat{p}) = \int (-C_2 + \hat{p})dC_2 \tag{2895}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{2896}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} \tag{2897}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{2898}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{2899}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{2900}$$

1.5.95 Derivation 94

$$\mathbf{p}(E_x) = \sin{(e^{E_x})} \tag{2901}$$

$$\dot{y}(U) = \sin{(U)} \tag{2902}$$

$$\frac{d}{dU}\dot{y}(U) = \frac{d}{dU}\sin{(U)} \tag{2903}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) = \frac{d}{dE_x}\sin{(e^{E_x})} \tag{2904}$$

$$\frac{d}{dU}\dot{y}(U) = \cos{(U)} \tag{2905}$$

$$\frac{d}{dU}\sin{(U)} = \cos{(U)} \tag{2906}$$

$$\frac{d}{dE_x}\mathbf{p}(E_x) + \frac{d}{dU}\sin{(U)} = \frac{d}{dU}\sin{(U)} + \frac{d}{dE_x}\sin{(e^{E_x})} \tag{2907}$$

$$\cos{(U)} + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos{(U)} + \frac{d}{dE_x}\sin{(e^{E_x})} \tag{2908}$$

1.5.96 Derivation 95

$$\mathrm{v_y}(L) = e^L \tag{2909}$$

$$\frac{d}{dL}\mathrm{v_y}(L) = \frac{d}{dL}e^L \tag{2910}$$

$$2\,\mathrm{v_y}(L) = \mathrm{v_y}(L) + e^L \tag{2911}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}(L) = \frac{d^2}{dL^2}e^L \tag{2912}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}(L) = e^L \tag{2913}$$

$$2\,\mathrm{v_y}(L) = \mathrm{v_y}(L) + \frac{d^2}{dL^2}\mathrm{v_y}(L) \tag{2914}$$

1.5.97 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{2915}$$

$$\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} = 1 \tag{2916}$$

$$\frac{\mathbf{s}\psi(\mathbf{s}, h)}{h} + 1 = 2 \tag{2917}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{2918}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{2919}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \frac{1}{\mathbf{s}^2} \tag{2920}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h}-1} \tag{2921}$$

1.5.98 Derivation 97

$$\mathbf{J}_f(F_g) = e^{e^{F_g}} \tag{2922}$$

$$\int \mathbf{J}_f(F_g)dF_g = \int e^{e^{F_g}}dF_g \tag{2923}$$

$$\int \mathbf{J}_f(F_g)dF_g = h + \mathrm{Ei}\,(e^{F_g}) \tag{2924}$$

$$2\int \mathbf{J}_f(F_g)dF_g = h + \mathrm{Ei}\,(e^{F_g}) + \int \mathbf{J}_f(F_g)dF_g \tag{2925}$$

$$h + \mathrm{Ei}\left(e^{F_g}\right) = \int e^{e^{F_g}} dF_g \quad (2926)$$

$$2 \int \mathbf{J}_f(F_g) dF_g = \int \mathbf{J}_f(F_g) dF_g + \int e^{e^{F_g}} dF_g \quad (2927)$$

$$2 \int \mathbf{J}_f(F_g) dF_g = z^* + \mathrm{Ei}\left(e^{F_g}\right) + \int \mathbf{J}_f(F_g) dF_g \quad (2928)$$

1.5.99 Derivation 98

$$\Psi(\delta) = \log(\delta) \quad (2929)$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log(\delta) \quad (2930)$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \quad (2931)$$

$$\frac{d}{d\delta}\log(\delta) = \frac{1}{\delta} \quad (2932)$$

$$(\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log(\delta) = \frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} \quad (2933)$$

1.5.100 Derivation 99

$$\mathbf{S}(G, \Omega) = G + \Omega \quad (2934)$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = \frac{\partial}{\partial\Omega}(G + \Omega) \quad (2935)$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = 1 \quad (2936)$$

$$(G + \Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = G + \Omega \quad (2937)$$

$$\mathrm{f}_{\mathbf{p}}(G, \Omega) = (G + \Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) \quad (2938)$$

$$\mathrm{f}_{\mathbf{p}}(G, \Omega) = (G + \Omega)\frac{\partial}{\partial\Omega}(G + \Omega) \quad (2939)$$

$$\mathrm{f}_{\mathbf{p}}(G, \Omega) = (G+\Omega)\frac{\partial}{\partial\Omega}(G+\Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega)\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) \quad (2940)$$

2 gpt-4 output

2.1 Perturbation: static

2.1.1 Derivation 1

$$\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \quad (2941)$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) \quad (2942)$$

$$\frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) = -\sin(\mathbf{s}) \quad (2943)$$

2.1.2 Derivation 2

$$\mathbb{I}(\Psi_\lambda) = e^{\Psi_\lambda} \quad (2944)$$

$$\int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \int e^{\Psi_\lambda} d\Psi_\lambda \quad (2945)$$

$$\int e^{\Psi_\lambda} d\Psi_\lambda = e^{\Psi_\lambda} + \chi \quad (2946)$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + e^{\Psi_\lambda} + \chi \quad (2947)$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \quad (2948)$$

2.1.3 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \quad (2949)$$

$$\int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r} \quad (2950)$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \quad (2951)$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \quad (2952)$$

2.1.4 Derivation 4

$$\mathrm{V}_{\mathbf{B}}(P_e) = \sin(P_e) \quad (2953)$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) = \frac{d}{dP_e}\sin(P_e) \quad (2954)$$

$$\frac{d}{dP_e}\sin(P_e) = \cos(P_e) \quad (2955)$$

$$-1 + \frac{\frac{d}{dP_e}\sin(P_e)}{P_e} = -1 + \frac{\cos(P_e)}{P_e} \quad (2956)$$

2.1.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{2957}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{2958}$$

$$\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{2959}$$

$$\int F_c \cos\left(\mathbf{p}\right) dF_c = \int F_c \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) dF_c \tag{2960}$$

2.1.6 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{2961}$$

$$\frac{\partial}{\partial\varphi}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 1 \tag{2962}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{2963}$$

$$\left(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)}\right)^{\sigma_x} = e^{0\sigma_x} \tag{2964}$$

$$\left(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)}\right)^{\sigma_x} = 1 \tag{2965}$$

2.1.7 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) \tag{2966}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{2967}$$

$$0 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) \tag{2968}$$

$$0 = \frac{\partial}{\partial\phi}1 \tag{2969}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi)-1 \tag{2970}$$

2.1.8 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log\left(\mathbf{g}\right) \tag{2971}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{2972}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{2973}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right)\right) = \cos\left(\frac{1}{\mathbf{g}}\right) \tag{2974}$$

2.1.9 Derivation 16

$$f(C_d) = C_d \tag{2975}$$

$$\frac{d}{dC_d}f(C_d) = \frac{d}{dC_d}C_d \tag{2976}$$

$$\frac{d}{dC_d}f(C_d) = 1 \tag{2977}$$

$$\frac{1}{\frac{d}{df(C_d)}f(C_d)} = \frac{1}{\frac{d}{dC_d}C_d} \tag{2978}$$

$$1 = \frac{1}{\frac{d}{df(C_d)}f(C_d)} \tag{2979}$$

2.1.10 Derivation 17

$$\hat{X}(f') = \cos\left(f'\right) \tag{2980}$$

$$\frac{d}{d(f')}\hat{X}(f') = -\sin\left(f'\right) \tag{2981}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos\left(f'\right) \tag{2982}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\left(f'\right)} = -\frac{\cos\left(f'\right)}{\mathrm{P_e}\left(f'\right)} \tag{2983}$$

2.1.11 Derivation 18

$$W(P_e) = \log\left(P_e\right) \tag{2984}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log\left(P_e\right) \tag{2985}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{2986}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right) dP_e = \int \frac{1}{P_e} dP_e \tag{2987}$$

2.1.12 Derivation 19

$$\mathrm{E}_\lambda\left(\hat{H}_l\right) = \int e^{\hat{H}_l} d\hat{H}_l \tag{2988}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l})^2 \tag{2989}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{2990}$$

2.1.13 Derivation 21

$$\mathrm{E_n}\left(S\right) = \int e^{S} dS \tag{2991}$$

$$\mathrm{E_n}\left(S\right) = x + e^{S} \tag{2992}$$

$$x + e^{S} = T + e^{S} \tag{2993}$$

$$\int \mathrm{E_n}\left(S\right) dT = \int (T + e^{S}) dT \tag{2994}$$

$$\int \mathrm{E_n}\left(S\right) dT = \frac{T^2}{2} + Te^{S} + \psi^* \tag{2995}$$

$$\frac{T^2}{2} + Te^{S} + \psi^* = \frac{T^2}{2} + Te^{S} + t_2 \tag{2996}$$

2.1.14 Derivation 23

$$\mathbf{p}(\phi) = \cos\left(e^{\phi}\right) \tag{2997}$$

$$\frac{d}{d\phi}\mathbf{p}(\phi) = -e^{\phi}\sin\left(e^{\phi}\right) \tag{2998}$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos\left(e^{\phi}\right) d\phi \tag{2999}$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}\left(e^{\phi}\right) \tag{3000}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi) d\phi d\phi = \frac{\partial}{\partial\phi}\int (\omega + \mathrm{Ci}\left(e^{\phi}\right)) d\phi \tag{3001}$$

2.1.15 Derivation 25

$$\theta_1(g) = e^{g} \tag{3002}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^{g} = \frac{d}{dg}(\int e^{g} dg)^{g} \tag{3003}$$

$$\mathbf{g} + \theta_1(g) = \mathbf{g} + e^{g} \tag{3004}$$

$$(\mathbf{g} + \theta_1(g))^{g} = (\mathbf{g} + e^{g})^{g} \tag{3005}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^{g} = \frac{\partial}{\partial g}(\mathbf{g} + e^{g})^{g} \tag{3006}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^{g} = \frac{d}{dg}(\int e^{g} dg)^{g} \tag{3007}$$

2.1.16 Derivation 27

$$\phi(x') = \int \log\left(x'\right) dx' \tag{3008}$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log\left(x'\right) dx' \tag{3009}$$

$$\frac{d}{dx'}\phi(x') = \log\left(x'\right) \tag{3010}$$

$$\mathrm{t_1}\left(x', n_2\right) = \frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') \tag{3011}$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') \tag{3012}$$

$$\mathrm{t_1}\left(x', n_2\right) e^{-\frac{d}{dx'}\phi(x')} = e^{-\log\left(x'\right)}\frac{d}{dx'}\phi(x') \tag{3013}$$

$$\mathrm{t_1}\left(x', n_2\right) e^{-\frac{d}{dx'}\phi(x')} = e^{-\frac{d}{dx'}\phi(x')}\frac{d}{dx'}\phi(x') \tag{3014}$$

2.1.17 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{3015}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{3016}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{3017}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \tag{3018}$$

2.1.18 Derivation 35

$$\lambda(V) = V \tag{3019}$$

$$\frac{d}{dV}\lambda(V) = \frac{d}{dV}V \tag{3020}$$

$$\frac{d}{dV}\lambda(V) = 1 \tag{3021}$$

$$\frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} = \frac{V\cdot 1}{V^2} - \frac{1}{V} \tag{3022}$$

$$\frac{1}{V} - \frac{1}{V} = 0 \tag{3023}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} = 0 \tag{3024}$$

2.1.19 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = A + V - \dot{z} \tag{3025}$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \int (A + V - \dot{z}) dV \tag{3026}$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{3027}$$

$$\int (A + V - \dot{z}) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{3028}$$

2.1.20 Derivation 37

$$\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} \tag{3029}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} \mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} e^{\mathbf{S}} \tag{3030}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{3031}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} \mathrm{A_x}(\mathbf{S})) \tag{3032}$$

2.1.21 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{3033}$$

$$\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \tag{3034}$$

$$\int (\mathbf{A} + \varepsilon_0) d\mathbf{A} = \frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x \tag{3035}$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{3036}$$

$$(\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{3037}$$

2.1.22 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{3038}$$

$$\int \mathrm{F_x}(\pi) d\pi = \int e^{e^{\pi}} d\pi \tag{3039}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^{\pi}) \tag{3040}$$

$$0 = F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi) d\pi \tag{3041}$$

$$0 = F_g - P_g \tag{3042}$$

2.1.23 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{3043}$$

$$\int u(\lambda) d\lambda = \int \sin(\lambda) d\lambda \tag{3044}$$

$$\int u(\lambda) d\lambda = n - \cos(\lambda) \tag{3045}$$

$$-\frac{\int \sin(\lambda) d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{3046}$$

2.1.24 Derivation 49

$$\hat{x}(f) = \int \log(f) df \tag{3047}$$

$$\frac{d}{df}\hat{x}(f) = \log(f) \tag{3048}$$

$$\int \frac{d}{df}\hat{x}(f) df = \int \log(f) df \tag{3049}$$

$$\hat{x}(f) = B + f\log(f) - f \tag{3050}$$

$$B + f\log(f) = f + \int \log(f) df \tag{3051}$$

2.1.25 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{3052}$$

$$\int \mathbf{v}(C_2) dC_2 = \int C_2 dC_2 \tag{3053}$$

$$\int \mathbf{v}(C_2) dC_2 = \frac{C_2^2}{2} + v \tag{3054}$$

$$\mathbf{v}^2(C_2) = C_2^2 \tag{3055}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = v + \frac{C_2^2}{2} \tag{3056}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{3057}$$

2.1.26 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{3058}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log(\mathbf{s}) d\mathbf{s} \tag{3059}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s}\log(\mathbf{s}) - \mathbf{s} + \omega \tag{3060}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{3061}$$

$$a(\mathbf{s}) = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{3062}$$

2.1.27 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{3063}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \frac{d}{dA}e^A \tag{3064}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = e^A \tag{3065}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = (e^A)^A \tag{3066}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = \mathrm{A_y}^A(A) \tag{3067}$$

2.1.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{3068}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} \tag{3069}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = -\frac{r_0}{\mathbf{P}^2} \tag{3070}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} = -\frac{r_0}{\mathbf{P}^3} \tag{3071}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = \frac{r_0}{\mathbf{P}^3} \tag{3072}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{3073}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{3074}$$

2.1.29 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{3075}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \frac{d}{d\psi^*}\sin(\psi^*) \tag{3076}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \cos(\psi^*) \tag{3077}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{3078}$$

2.1.30 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{3079}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{3080}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{3081}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{3082}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{3083}$$

2.1.31 Derivation 58

$$\mathrm{E_x}(t_2) = \frac{1}{t_2} \tag{3084}$$

$$\int \mathrm{E_x}(t_2) dt_2 = \int \frac{1}{t_2} dt_2 \tag{3085}$$

$$\int \mathrm{E_x}(t_2) dt_2 = C_1 + \log(t_2) \tag{3086}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \mathrm{E_x}(t_2) dt_2)^{t_2} \tag{3087}$$

2.1.32 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{3088}$$

$$\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*} \log(\psi^*) \tag{3089}$$

$$\frac{d}{d\psi^*} \log(\psi^*) = \frac{1}{\psi^*} \tag{3090}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} \tag{3091}$$

2.1.33 Derivation 60

$$H(u) = e^u \tag{3092}$$

$$\frac{e^u}{H(u)} = \frac{e^u}{e^u} \tag{3093}$$

$$\frac{e^u}{H(u)} = 1 \tag{3094}$$

$$\int \frac{e^u}{H(u)} du = \int 1 du \tag{3095}$$

$$\int \frac{e^u}{H(u)} du = A_x + u \tag{3096}$$

$$-\int \frac{e^u}{H(u)} du = -(A_x + u) \tag{3097}$$

2.1.34 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{3098}$$

$$\frac{\partial}{\partial s} q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}(\mathbf{M} + s) \tag{3099}$$

$$\frac{\partial}{\partial s} q(\mathbf{M}, s) = 0 \tag{3100}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{3101}$$

2.1.35 Derivation 64

$$\delta(q) = \log(q) \tag{3102}$$

$$0 = A_2 + q\log(q) - q - \int \delta(q) dq \tag{3103}$$

$$0 = A_2 + q\log(q) - q - \int \log(q) dq \tag{3104}$$

$$0 = A_2 - m_s + q\delta(q) - q\log(q) \tag{3105}$$

$$\frac{d}{dA_2} 0 = \frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log(q)) \tag{3106}$$

2.1.36 Derivation 65

$$\mathrm{A_y}(\phi_2) = \cos(\phi_2) \tag{3107}$$

$$\frac{d}{d\phi_2} \mathrm{A_y}(\phi_2) = \frac{d}{d\phi_2} \cos(\phi_2) \tag{3108}$$

$$\frac{d}{d\phi_2} \mathrm{A_y}(\phi_2) = -\sin(\phi_2) \tag{3109}$$

$$\frac{d^2}{d\phi_2^2} \cos(\phi_2) = -\cos(\phi_2) \tag{3110}$$

$$\frac{d^3}{d\phi_2^3} \cos(\phi_2) = \frac{d^2}{d\phi_2^2} - \sin(\phi_2) \tag{3111}$$

2.1.37 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*} e^{\varphi^*} \tag{3112}$$

$$\frac{d}{d\varphi^*} e^{\varphi^*} = e^{\varphi^*} \tag{3113}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{3114}$$

$$l(\varphi^*) - 1 = e^{\varphi^*} - 1 \tag{3115}$$

$$\frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{3116}$$

2.1.38 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos(U) \tag{3117}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2(U) \tag{3118}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \int \cos^2(U)dU \tag{3119}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} \tag{3120}$$

$$\frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} = \int \cos^2(U)dU \tag{3121}$$

2.1.39 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{3122}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{3123}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = 1 \tag{3124}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = (1^G)^G)^G \tag{3125}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = 1 \tag{3126}$$

2.1.40 Derivation 72

$$\mathrm{A_1}(\theta_1) = \cos(\theta_1) \tag{3127}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1)d\theta_1 = \int \cos^2(\theta_1)d\theta_1 \tag{3128}$$

$$\int \cos^2(\theta_1)d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} \tag{3129}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} = \int \cos^2(\theta_1)d\theta_1 \tag{3130}$$

2.1.41 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{3131}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}(s(\mathbf{J}_P + \rho_b)) \tag{3132}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{3133}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} \tag{3134}$$

2.1.42 Derivation 75

$$\mathrm{A_z}(F_N) = \sin(F_N) \tag{3135}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}(F_N)dF_N)^2 \tag{3136}$$

$$\mathbf{v}(F_N) = (\int \sin(F_N)dF_N)^2 \tag{3137}$$

$$\int \sin(F_N)dF_N = Q - \cos(F_N) \tag{3138}$$

$$\mathbf{v}(F_N) = (Q - \cos(F_N))^2 \tag{3139}$$

$$(\int \sin(F_N)dF_N)^2 = (Q - \cos(F_N))^2 \tag{3140}$$

2.1.43 Derivation 76

$$r(\hat{X}) = \sin(\hat{X}) \tag{3141}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin(\hat{X}) \tag{3142}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos(\hat{X}) \tag{3143}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = \frac{d^2}{d\hat{X}^2}\sin(\hat{X}) \tag{3144}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin(\hat{X}) \tag{3145}$$

2.1.44 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{3146}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \int \cos(L_\varepsilon) dL_\varepsilon \tag{3147}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \sin(L_\varepsilon) + C \tag{3148}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \sin(L_\varepsilon) + C + 1 \tag{3149}$$

$$\pi + \sin(L_\varepsilon) + 1 = \sin(L_\varepsilon) + C + 1 \tag{3150}$$

$$C = \pi \tag{3151}$$

$$(r_0 + \sin(L_\varepsilon) + 1)^\pi = (\pi + \sin(L_\varepsilon) + 1)^\pi \tag{3152}$$

2.1.45 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l) d\hat{H}_l \tag{3153}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{3154}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{3155}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{3156}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos(\hat{H}_l))^C \tag{3157}$$

2.1.46 Derivation 82

$$\mathrm{f}'(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f} \sin(\mathbf{J}_f) \tag{3158}$$

$$\mathrm{f}'(\mathbf{J}_f) = \cos(\mathbf{J}_f) \tag{3159}$$

$$\cos(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f} \sin(\mathbf{J}_f) \tag{3160}$$

$$\mathrm{f}'(\mathbf{J}_f) \sin(\mathbf{J}_f) = \sin(\mathbf{J}_f) \cos(\mathbf{J}_f) \tag{3161}$$

2.1.47 Derivation 90

$$\omega(\mu) = e^\mu \tag{3162}$$

$$\frac{e^\mu}{\omega(\mu)} = \frac{e^\mu}{e^\mu} \tag{3163}$$

$$\frac{e^\mu}{\omega(\mu)} = 1 \tag{3164}$$

$$\int \frac{e^\mu}{\omega(\mu)} d\mu = \int 1 d\mu \tag{3165}$$

$$\int \frac{e^\mu}{\omega(\mu)} d\mu = \mu + \mathbf{J} \tag{3166}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \int \frac{e^\mu}{\omega(\mu)} d\mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{3167}$$

2.1.48 Derivation 91

$$\mathrm{v_t}(q) = \int \cos(q) dq \tag{3168}$$

$$\mathrm{v_t}(q) = E + \sin(q) \tag{3169}$$

$$\mathrm{y}'(q, E) = -E - \sin(q) + \frac{E + \sin(q)}{E} \tag{3170}$$

$$\mathrm{y}'(q, E) = -E - \sin(q) + \frac{\int \cos(q) dq}{E} \tag{3171}$$

2.1.49 Derivation 92

$$\mathbf{J}(q) = \log(q) \tag{3172}$$

$$\frac{d}{dq} \mathbf{J}(q) = \frac{d}{dq} \log(q) \tag{3173}$$

$$\frac{d}{dq} \mathbf{J}(q) = \frac{1}{q} \tag{3174}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \mathbf{v} \frac{1}{q} dq dq}{\log(q)} \tag{3175}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{3176}$$

2.1.50 Derivation 97

$$\mathbf{J}_f(F_g) = e^{e^{F_g}} \tag{3177}$$

$$\int \mathbf{J}_f(F_g) dF_g = \int e^{e^{F_g}} dF_g \tag{3178}$$

$$\int \mathbf{J}_f(F_g) dF_g = h + \operatorname{Ei}\left(e^{F_g}\right) \tag{3179}$$

$$2\int \mathbf{J}_f(F_g) dF_g = 2(h + \operatorname{Ei}\left(e^{F_g}\right)) \tag{3180}$$

$$2\int \mathbf{J}_f(F_g) dF_g = z^* + \operatorname{Ei}\left(e^{F_g}\right) + \int \mathbf{J}_f(F_g) dF_g \tag{3181}$$

2.2 Perturbation: VR

2.2.1 Derivation 1

$$\beta(\gamma) = \frac{d}{d\gamma} \sin(\gamma) \tag{3182}$$

$$\frac{d}{d\gamma}\beta(\gamma) = \frac{d^2}{d\gamma^2} \sin(\gamma) \tag{3183}$$

$$\frac{d^2}{d\gamma^2} \sin(\gamma) = -\sin(\gamma) \tag{3184}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{3185}$$

$$\frac{d^2}{d\gamma^2} \sin(\gamma) = -\sin(\gamma) \tag{3186}$$

2.2.2 Derivation 2

$$\nu(\tau) = e^\tau \tag{3187}$$

$$\int \nu(\tau) d\tau = \int e^\tau d\tau \tag{3188}$$

$$\int \nu(\tau) d\tau = e^\tau + \gamma \tag{3189}$$

$$\tau + \int \nu(\tau) d\tau = \tau + e^\tau + \gamma \tag{3190}$$

$$\tau + \int \nu(\tau) d\tau = \gamma + \tau + \nu(\tau) \tag{3191}$$

2.2.3 Derivation 3

$$\gamma(\iota, \beta) = \int (-\beta + \iota) d\beta \tag{3192}$$

$$\int (-\beta + \iota) d\beta = -\frac{\beta^2}{2} + \beta\iota + \nu \tag{3193}$$

$$\beta\gamma(\iota, \beta) = \beta \int (-\beta + \iota) d\beta \tag{3194}$$

$$\beta\gamma(\iota, \beta) = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{3195}$$

$$\beta \int (-\beta + \iota) d\beta = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{3196}$$

2.2.4 Derivation 4

$$\beta(o) = \sin(o) \tag{3197}$$

$$\frac{d}{do}\beta(o) = \frac{d}{do} \sin(o) \tag{3198}$$

$$\frac{d}{do}\beta(o) = \cos(o) \tag{3199}$$

$$-1 + \frac{\frac{d}{do} \sin(o)}{o} = -1 + \frac{\cos(o)}{o} \tag{3200}$$

2.2.5 Derivation 7

$$\tau(\nu) = \sin(\nu) \tag{3201}$$

$$\frac{d}{d\nu}\tau(\nu) = \frac{d}{d\nu} \sin(\nu) \tag{3202}$$

$$\frac{d}{d\nu}\tau(\nu) = \cos(\nu) \tag{3203}$$

$$\frac{d}{d\nu} \sin(\nu) = \cos(\nu) \tag{3204}$$

$$\int \alpha \cos(\nu) d\alpha = \int \alpha \frac{d}{d\nu} \sin(\nu) d\alpha \tag{3205}$$

2.2.6 Derivation 8

$$o(\alpha, \beta) = -\alpha + \beta \tag{3206}$$

$$\frac{\partial}{\partial\beta} o(\alpha, \beta) = 1 \tag{3207}$$

$$\frac{\partial^2}{\partial\beta^2} o(\alpha, \beta) = 0 \tag{3208}$$

$$e^{\frac{\partial^2}{\partial\beta^2} o(\alpha, \beta)} = e^0 \tag{3209}$$

$$(e^{\frac{\partial^2}{\partial\beta^2} o(\alpha, \beta)})^\alpha = 1 \tag{3210}$$

2.2.7 Derivation 9

$$\beta(\kappa,\tau) = \frac{\partial}{\partial\kappa}(\kappa-\tau) \tag{3211}$$

$$\beta(\kappa,\tau) = 1 \tag{3212}$$

$$\frac{\partial}{\partial\kappa}\beta(\kappa,\tau) = \frac{\partial}{\partial\kappa}1 \tag{3213}$$

$$\frac{\partial}{\partial\kappa}\beta(\kappa,\tau) = 0 \tag{3214}$$

$$-3\frac{\partial}{\partial\kappa}(\kappa-\tau)-1 = -3\frac{\partial}{\partial\kappa}(\kappa-\tau)+\frac{\partial^2}{\partial\kappa^2}(\kappa-\tau)-1 \tag{3215}$$

2.2.8 Derivation 12

$$\zeta(\gamma) = \log(\gamma) \tag{3216}$$

$$\frac{d}{d\gamma}\zeta(\gamma) = \frac{d}{d\gamma}\log(\gamma) \tag{3217}$$

$$\frac{d}{d\gamma}\log(\gamma) = \frac{1}{\gamma} \tag{3218}$$

$$\cos(\frac{d}{d\gamma}\log(\gamma)) = \cos(\frac{1}{\gamma}) \tag{3219}$$

2.2.9 Derivation 16

$$\upsilon(\kappa) = \kappa \tag{3220}$$

$$\frac{d}{d\kappa}\upsilon(\kappa) = \frac{d}{d\kappa}\kappa \tag{3221}$$

$$\frac{d}{d\kappa}\upsilon(\kappa) = 1 \tag{3222}$$

$$\frac{1}{\frac{d}{d\upsilon(\kappa)}\upsilon(\kappa)} = \frac{1}{\frac{d}{d\kappa}\kappa} \tag{3223}$$

$$1 = \frac{1}{\frac{d}{d\upsilon(\kappa)}\upsilon(\kappa)} \tag{3224}$$

2.2.10 Derivation 17

$$\alpha(\nu) = \cos(\nu) \tag{3225}$$

$$\frac{d}{d\nu}\alpha(\nu) = -\sin(\nu) \tag{3226}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = -\cos(\nu) \tag{3227}$$

$$\frac{\frac{d^2}{d\nu^2}\alpha(\nu)}{\tau(\nu)} = -\frac{\cos(\nu)}{\tau(\nu)} \tag{3228}$$

2.2.11 Derivation 18

$$\alpha(\zeta) = \log(\zeta) \tag{3229}$$

$$\frac{d}{d\zeta}\alpha(\zeta) = \frac{d}{d\zeta}\log(\zeta) \tag{3230}$$

$$\frac{d}{d\zeta}\log(\zeta) = \frac{1}{\zeta} \tag{3231}$$

$$\int\frac{d}{d\zeta}\log(\zeta)d\zeta = \int\frac{1}{\zeta}d\zeta \tag{3232}$$

2.2.12 Derivation 19

$$\xi(\zeta) = \int e^{\zeta}d\zeta \tag{3233}$$

$$0 = (\alpha+e^{\zeta})(\alpha-\xi(\zeta)+e^{\zeta})^2 \tag{3234}$$

$$0 = (\alpha+e^{\zeta})(\alpha+e^{\zeta}-\int e^{\zeta}d\zeta)^2 \tag{3235}$$

2.2.13 Derivation 21

$$\upsilon(\tau) = \int e^{\tau}d\tau \tag{3236}$$

$$\upsilon(\tau) = \kappa+e^{\tau} \tag{3237}$$

$$\kappa+e^{\tau} = \alpha+e^{\tau} \tag{3238}$$

$$\int\upsilon(\tau)d\alpha = \int(\alpha+e^{\tau})d\alpha \tag{3239}$$

$$\int\upsilon(\tau)d\alpha = \frac{\alpha^2}{2}+\alpha e^{\tau}+\iota \tag{3240}$$

$$\frac{\alpha^2}{2}+\alpha e^{\tau}+\iota = \frac{\alpha^2}{2}+\alpha e^{\tau}+\xi \tag{3241}$$

2.2.14 Derivation 23

$$\zeta(\beta) = \cos(e^{\beta}) \tag{3242}$$

$$\frac{d}{d\beta}\zeta(\beta) = -e^{\beta}\sin(e^{\beta}) \tag{3243}$$

$$\int\zeta(\beta)d\beta = \int\cos(e^{\beta})d\beta \tag{3244}$$

$$\int\zeta(\beta)d\beta = \kappa+\mathrm{Ci}(e^{\beta}) \tag{3245}$$

$$\frac{d}{d\beta}\iint\zeta(\beta)d\beta d\beta = \frac{\partial}{\partial\beta}\int(\kappa+\mathrm{Ci}(e^{\beta}))d\beta \tag{3246}$$

2.2.15 Derivation 25

$$\beta(\tau) = e^{\tau} \tag{3247}$$

$$\frac{d}{d\tau}(\int \beta(\tau)d\tau)^{\tau} = \frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{3248}$$

$$\int \beta(\tau)d\tau = \int e^{\tau}d\tau \tag{3249}$$

$$\iota + \int e^{\tau}d\tau = \iota + e^{\tau} \tag{3250}$$

$$(\iota + e^{\tau})^{\tau} = (\iota + \beta(\tau))^{\tau} \tag{3251}$$

$$\frac{\partial}{\partial\tau}(\iota + e^{\tau})^{\tau} = \frac{\partial}{\partial\tau}(\iota + \beta(\tau))^{\tau} \tag{3252}$$

$$\frac{\partial}{\partial\tau}(\iota + \beta(\tau))^{\tau} = \frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{3253}$$

2.2.16 Derivation 27

$$\xi(\alpha) = \int \log{(\alpha)}d\alpha \tag{3254}$$

$$\frac{d}{d\alpha}\xi(\alpha) = \frac{d}{d\alpha}\int \log{(\alpha)}d\alpha \tag{3255}$$

$$\frac{d}{d\alpha}\xi(\alpha) = \log{(\alpha)} \tag{3256}$$

$$\tau(\alpha,\nu) = \frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{3257}$$

$$\frac{d}{d\alpha}\xi(\alpha) = \frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{3258}$$

$$\tau(\alpha,\nu)e^{-\frac{d}{d\alpha}\xi(\alpha)} = e^{-\frac{d}{d\alpha}\xi(\alpha)}\frac{d}{d\alpha}\xi(\alpha) \tag{3259}$$

2.2.17 Derivation 34

$$\iota(\gamma,\tau,\beta) = \frac{\gamma\tau}{\beta} \tag{3260}$$

$$\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) = \frac{\partial}{\partial\tau}\frac{\gamma\tau}{\beta} \tag{3261}$$

$$\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) = \frac{\gamma}{\beta} \tag{3262}$$

$$\iota(\gamma,\tau,\beta) = \tau\frac{\partial}{\partial\tau}\iota(\gamma,\tau,\beta) \tag{3263}$$

2.2.18 Derivation 35

$$\zeta(\nu) = \nu \tag{3264}$$

$$\frac{d}{d\nu}\zeta(\nu) = \frac{d}{d\nu}\nu \tag{3265}$$

$$\frac{d}{d\nu}\zeta(\nu) = 1 \tag{3266}$$

$$\frac{\nu\frac{d}{d\nu}\zeta(\nu)}{\zeta^2(\nu)} - \frac{1}{\zeta(\nu)} = \frac{\nu(1)}{\nu^2} - \frac{1}{\nu} \tag{3267}$$

$$\frac{\nu\frac{d}{d\nu}\zeta(\nu)}{\zeta^2(\nu)} - \frac{1}{\zeta(\nu)} = \frac{1}{\nu} - \frac{1}{\nu} \tag{3268}$$

$$\frac{\nu\frac{d}{d\nu}\zeta(\nu)}{\zeta^2(\nu)} - \frac{1}{\zeta(\nu)} = 0 \tag{3269}$$

$$\frac{\frac{d}{d\zeta(\nu)}\zeta(\nu)}{\zeta(\nu)} - \frac{1}{\zeta(\nu)} = 0 \tag{3270}$$

2.2.19 Derivation 36

$$\beta(\xi,\iota,\alpha) = \alpha - \iota + \xi \tag{3271}$$

$$\int \beta(\xi,\iota,\alpha)d\alpha = \int(\alpha - \iota + \xi)d\alpha \tag{3272}$$

$$\int \beta(\xi,\iota,\alpha)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \tag{3273}$$

$$\int(\alpha - \iota + \xi)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \tag{3274}$$

2.2.20 Derivation 37

$$\zeta(\beta) = e^{\beta} \tag{3275}$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{d}{d\beta}e^{\beta} \tag{3276}$$

$$e^{\beta} + \frac{d}{d\beta}\zeta(\beta) = e^{\beta} + \frac{d}{d\beta}e^{\beta} \tag{3277}$$

$$e^{\beta} + \frac{d}{d\beta}\zeta(\beta) = 2e^{\beta} \tag{3278}$$

$$\frac{d}{d\beta}(\zeta(\beta) + e^{\beta}) = \frac{d}{d\beta}(e^{\beta} + \frac{d}{d\beta}\zeta(\beta)) \tag{3279}$$

2.2.21 Derivation 39

$$\gamma(\beta,\nu) = \beta + \nu \tag{3280}$$

$$\int \gamma(\beta,\nu)d\nu = \int (\beta+\nu)d\nu \tag{3281}$$

$$\int (\beta+\nu)d\nu = \beta\nu + \frac{\nu^2}{2} + \tau \tag{3282}$$

$$(\int \gamma(\beta,\nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \tag{3283}$$

$$(\int (\beta+\nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \tag{3284}$$

2.2.22 Derivation 41

$$o(\xi) = e^{e^\xi} \tag{3285}$$

$$\int o(\xi)d\xi = \int e^{e^\xi}d\xi \tag{3286}$$

$$\int o(\xi)d\xi = \iota + \mathrm{Ei}\,(e^\xi) \tag{3287}$$

$$0 = \zeta + \mathrm{Ei}\,(e^\xi) - \int o(\xi)d\xi \tag{3288}$$

$$0 = -\iota + \zeta \tag{3289}$$

2.2.23 Derivation 46

$$\tau(\kappa) = \sin(\kappa) \tag{3290}$$

$$\int \tau(\kappa)d\kappa = \int \sin(\kappa)d\kappa \tag{3291}$$

$$\int \tau(\kappa)d\kappa = \zeta - \cos(\kappa) \tag{3292}$$

$$\int \sin(\kappa)d\kappa = \zeta - \cos(\kappa) \tag{3293}$$

$$-\frac{\int \sin(\kappa)d\kappa}{\cos(\kappa)} = -\frac{\zeta - \cos(\kappa)}{\cos(\kappa)} \tag{3294}$$

2.2.24 Derivation 49

$$\upsilon(\iota) = \int \log(\iota)d\iota \tag{3295}$$

$$\upsilon(\iota) = \iota\log(\iota) - \iota + \zeta \tag{3296}$$

$$\iota\log(\iota) + \zeta = \iota + \int \log(\iota)d\iota \tag{3297}$$

2.2.25 Derivation 50

$$\gamma(\beta) = \beta \tag{3298}$$

$$\int \gamma(\beta)d\beta = \int \beta d\beta \tag{3299}$$

$$\int \gamma(\beta)d\beta = \frac{\beta^2}{2} + o \tag{3300}$$

$$\alpha + \frac{\gamma^2(\beta)}{2} = \alpha + \frac{\beta^2}{2} \tag{3301}$$

$$\alpha + \frac{\gamma^2(\beta)}{2} = o + \frac{\gamma^2(\beta)}{2} \tag{3302}$$

$$\alpha + \frac{\beta^2}{2} = \frac{\beta^2}{2} + o \tag{3303}$$

2.2.26 Derivation 51

$$\nu(\xi) = \log(\xi) \tag{3304}$$

$$\int \nu(\xi)d\xi = \int \log(\xi)d\xi \tag{3305}$$

$$\int \nu(\xi)d\xi = \kappa + \xi\log(\xi) - \xi \tag{3306}$$

$$\tau(\xi) = \nu(\xi) - \int \nu(\xi)d\xi \tag{3307}$$

$$\tau(\xi) = -\kappa - \xi\log(\xi) + \xi + \nu(\xi) \tag{3308}$$

2.2.27 Derivation 53

$$\kappa(\nu) = e^\nu \tag{3309}$$

$$\frac{d}{d\nu}\kappa(\nu) = \frac{d}{d\nu}e^\nu \tag{3310}$$

$$\frac{d}{d\nu}\kappa(\nu) = e^\nu \tag{3311}$$

$$(\frac{d}{d\nu}\kappa(\nu))^\nu = (e^\nu)^\nu \tag{3312}$$

$$(\frac{d}{d\nu}\kappa(\nu))^\nu = \kappa^\nu(\nu) \tag{3313}$$

2.2.28 Derivation 54

$$\zeta(\tau,\xi) = \frac{\xi}{\tau} \tag{3314}$$

$$\frac{\partial}{\partial\tau}\zeta(\tau,\xi) = \frac{\partial}{\partial\tau}\frac{\xi}{\tau} \tag{3315}$$

$$\frac{\partial}{\partial\tau}\frac{\xi}{\tau} = -\frac{\xi}{\tau^2} \tag{3316}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} = \frac{-\frac{\xi}{\tau^2}}{\tau} \tag{3317}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} = -\frac{\xi}{\tau^3} \tag{3318}$$

$$\frac{\zeta(\tau,\xi)}{\tau^2} = \frac{\frac{\xi}{\tau}}{\tau^2} \tag{3319}$$

$$\frac{\zeta(\tau,\xi)}{\tau^2} = \frac{\xi}{\tau^3} \tag{3320}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} - \frac{\zeta(\tau,\xi)}{\tau^2} = -\frac{\xi}{\tau^3} - \frac{\xi}{\tau^3} \tag{3321}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} - \frac{\zeta(\tau,\xi)}{\tau^2} = -\frac{2\xi}{\tau^3} \tag{3322}$$

$$\frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^3} = -\frac{2\xi}{\tau^3} \tag{3323}$$

2.2.29 Derivation 56

$$\kappa(\beta) = \sin(\beta) \tag{3324}$$

$$\frac{d}{d\beta}\kappa(\beta) = \frac{d}{d\beta}\sin(\beta) \tag{3325}$$

$$\frac{d}{d\beta}\kappa(\beta) = \cos(\beta) \tag{3326}$$

$$\kappa(\beta) + \cos(\beta) = \sin(\beta) + \cos(\beta) \tag{3327}$$

2.2.30 Derivation 57

$$o(\alpha,\xi,\zeta) = \frac{\alpha\zeta}{\xi} \tag{3328}$$

$$\kappa(\alpha,\xi,\zeta) = \frac{\alpha\zeta}{\xi} \tag{3329}$$

$$\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) = \frac{\partial}{\partial\zeta}\frac{\alpha\zeta}{\xi} \tag{3330}$$

$$\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) = \frac{\alpha}{\xi} \tag{3331}$$

$$\kappa(\alpha,\xi,\zeta) = \zeta\frac{\partial}{\partial\zeta}o(\alpha,\xi,\zeta) \tag{3332}$$

2.2.31 Derivation 58

$$\kappa(\beta) = \frac{1}{\beta} \tag{3333}$$

$$\int \kappa(\beta)d\beta = \int \frac{1}{\beta}d\beta \tag{3334}$$

$$\int \kappa(\beta)d\beta = \iota + \log(\beta) \tag{3335}$$

$$(\iota + \log(\beta))^\beta = (\int \kappa(\beta)d\beta)^\beta \tag{3336}$$

2.2.32 Derivation 59

$$\iota(\upsilon) = \log(\upsilon) \tag{3337}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{d}{d\upsilon}\log(\upsilon) \tag{3338}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{1}{\upsilon} \tag{3339}$$

$$(((\frac{1}{\upsilon})^\upsilon)^\upsilon)^\upsilon = (((\frac{d}{d\upsilon}\log(\upsilon))^\upsilon)^\upsilon)^\upsilon \tag{3340}$$

2.2.33 Derivation 60

$$\kappa(\beta) = e^\beta \tag{3341}$$

$$\frac{e^\beta}{\kappa(\beta)} = \frac{e^\beta}{e^\beta} \tag{3342}$$

$$\frac{e^\beta}{\kappa(\beta)} = 1 \tag{3343}$$

$$\int \frac{e^\beta}{\kappa(\beta)}d\beta = \int 1 d\beta \tag{3344}$$

$$\int \frac{e^\beta}{\kappa(\beta)}d\beta = \beta + \zeta \tag{3345}$$

$$-\int \frac{e^\beta}{\kappa(\beta)}d\beta = -(\beta + \zeta) \tag{3346}$$

2.2.34 Derivation 61

$$\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}(\nu + \tau) \tag{3347}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu + \tau) \tag{3348}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial^2}{\partial\nu^2}(\nu + \tau) \tag{3349}$$

$$\frac{\partial^2}{\partial\nu^2}(\nu + \tau) = 0 \tag{3350}$$

2.2.35 Derivation 64

$$\beta(\upsilon) = \log(\upsilon) \tag{3351}$$

$$\int \beta(\upsilon)d\upsilon = \upsilon\log(\upsilon) - \upsilon + C \tag{3352}$$

$$0 = \gamma + \upsilon\log(\upsilon) - \upsilon - \int \beta(\upsilon)d\upsilon \tag{3353}$$

$$0 = \gamma + \upsilon\log(\upsilon) - \upsilon - (\upsilon\log(\upsilon) - \upsilon + C) \tag{3354}$$

$$0 = -\alpha + \gamma + \upsilon\beta(\upsilon) - \upsilon\log(\upsilon) \tag{3355}$$

$$\frac{d}{d\gamma}0 = \frac{\partial}{\partial\gamma}(-\alpha + \gamma + \upsilon\beta(\upsilon) - \upsilon\log(\upsilon)) \tag{3356}$$

2.2.36 Derivation 65

$$\tau(\alpha) = \cos(\alpha) \tag{3357}$$

$$\frac{d}{d\alpha}\tau(\alpha) = \frac{d}{d\alpha}\cos(\alpha) \tag{3358}$$

$$\frac{d}{d\alpha}\tau(\alpha) = -\sin(\alpha) \tag{3359}$$

$$\frac{d^2}{d\alpha^2}\cos(\alpha) = \frac{d}{d\alpha} - \sin(\alpha) \tag{3360}$$

$$\frac{d^3}{d\alpha^3}\cos(\alpha) = \frac{d^2}{d\alpha^2} - \sin(\alpha) \tag{3361}$$

2.2.37 Derivation 67

$$\nu(\iota) = \frac{d}{d\iota}e^{\iota} \tag{3362}$$

$$\frac{d}{d\iota}e^{\iota} = e^{\iota} \tag{3363}$$

$$\nu(\iota) = e^{\iota} \tag{3364}$$

$$\nu(\iota) - 1 = e^{\iota} - 1 \tag{3365}$$

$$\frac{d^2}{d\iota^2}e^{\iota} = e^{\iota} \tag{3366}$$

$$\nu(\iota) - 1 = \frac{d^2}{d\iota^2}e^{\iota} - 1 \tag{3367}$$

2.2.38 Derivation 70

$$\gamma(\zeta) = \cos(\zeta) \tag{3368}$$

$$\gamma^2(\zeta) = \cos^2(\zeta) \tag{3369}$$

$$\int \gamma^2(\zeta)d\zeta = \int \cos^2(\zeta)d\zeta \tag{3370}$$

$$\int \gamma^2(\zeta)d\zeta = \tau + \frac{\zeta}{2} + \frac{\sin(\zeta)\cos(\zeta)}{2} \tag{3371}$$

$$\tau + \frac{\zeta}{2} + \frac{\sin(\zeta)\cos(\zeta)}{2} = \int \cos^2(\zeta)d\zeta \tag{3372}$$

2.2.39 Derivation 71

$$\gamma(\beta,\kappa) = \beta - \kappa \tag{3373}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta,\kappa) = \frac{\partial}{\partial\beta}(\beta - \kappa) \tag{3374}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta,\kappa) = 1 \tag{3375}$$

$$(((\frac{\partial}{\partial\beta}\gamma(\beta,\kappa))^{\beta})^{\beta})^{\beta} = (1^{\beta})^{\beta})^{\beta} \tag{3376}$$

$$(((\frac{\partial}{\partial\beta}\gamma(\beta,\kappa))^{\beta})^{\beta})^{\beta} = 1 \tag{3377}$$

2.2.40 Derivation 72

$$\kappa(\iota) = \cos(\iota) \tag{3378}$$

$$\int \kappa(\iota)\cos(\iota)d\iota = \int \cos^2(\iota)d\iota \tag{3379}$$

$$\int \cos^2(\iota)d\iota = \frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} \tag{3380}$$

$$\frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} = \int \cos^2(\iota)d\iota \tag{3381}$$

2.2.41 Derivation 74

$$\beta(\alpha,o,\nu) = o(\alpha + \nu) \tag{3382}$$

$$\frac{\partial}{\partial o}\beta(\alpha,o,\nu) = \frac{\partial}{\partial o}(o(\alpha + \nu)) \tag{3383}$$

$$\frac{\partial}{\partial o}\beta(\alpha,o,\nu) = \alpha + \nu \tag{3384}$$

$$\frac{\frac{\partial}{\partial o}\beta(\alpha,o,\nu)}{\nu} = \frac{\alpha + \nu}{\nu} \tag{3385}$$

2.2.42 Derivation 75

$$\iota(\alpha) = \sin{(\alpha)} \tag{3386}$$

$$\upsilon(\alpha) = (\int \iota(\alpha) d\alpha)^2 \tag{3387}$$

$$\upsilon(\alpha) = (\int \sin{(\alpha)} d\alpha)^2 \tag{3388}$$

$$\int \sin{(\alpha)} d\alpha = \xi - \cos{(\alpha)} \tag{3389}$$

$$\upsilon(\alpha) = (\xi - \cos{(\alpha)})^2 \tag{3390}$$

$$(\int \sin{(\alpha)} d\alpha)^2 = (\xi - \cos{(\alpha)})^2 \tag{3391}$$

2.2.43 Derivation 76

$$\kappa(\xi) = \sin{(\xi)} \tag{3392}$$

$$\frac{d}{d\xi}\kappa(\xi) = \frac{d}{d\xi}\sin{(\xi)} \tag{3393}$$

$$\frac{d}{d\xi}\kappa(\xi) = \cos{(\xi)} \tag{3394}$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = \frac{d^2}{d\xi^2}\sin{(\xi)} \tag{3395}$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = -\sin{(\xi)} \tag{3396}$$

2.2.44 Derivation 78

$$\beta(\upsilon) = \cos{(\upsilon)} \tag{3397}$$

$$\int \beta(\upsilon) d\upsilon = \int \cos{(\upsilon)} d\upsilon \tag{3398}$$

$$\int \beta(\upsilon) d\upsilon = \sin{(\upsilon)} + C \tag{3399}$$

$$\int \beta(\upsilon) d\upsilon + 1 = \sin{(\upsilon)} + C + 1 \tag{3400}$$

$$\gamma = C + 1 \tag{3401}$$

$$\gamma + \sin{(\upsilon)} + 1 = \sin{(\upsilon)} + C + 1 + 1 \tag{3402}$$

$$(\tau + \sin{(\upsilon)} + 1)^\gamma = (\gamma + \sin{(\upsilon)} + 1)^\gamma \tag{3403}$$

2.2.45 Derivation 81

$$\beta(\zeta) = \int \sin{(\zeta)} d\zeta \tag{3404}$$

$$\beta(\zeta) = \alpha - \cos{(\zeta)} \tag{3405}$$

$$-\beta(\zeta) = -\alpha + \cos{(\zeta)} \tag{3406}$$

$$-\beta(\zeta) = -\upsilon + \cos{(\zeta)} \tag{3407}$$

$$(-\beta(\zeta))^\upsilon = (-\alpha + \cos{(\zeta)})^\upsilon \tag{3408}$$

2.2.46 Derivation 82

$$\upsilon(\xi) = \frac{d}{d\xi}\sin{(\xi)} \tag{3409}$$

$$\upsilon(\xi) = \cos{(\xi)} \tag{3410}$$

$$\upsilon(\xi)\sin{(\xi)} = \sin{(\xi)}\cos{(\xi)} \tag{3411}$$

2.2.47 Derivation 90

$$o(\tau) = e^\tau \tag{3412}$$

$$\frac{e^\tau}{o(\tau)} = \frac{e^\tau}{e^\tau} \tag{3413}$$

$$\frac{e^\tau}{o(\tau)} = 1 \tag{3414}$$

$$\int \frac{e^\tau}{o(\tau)} d\tau = \int 1 d\tau \tag{3415}$$

$$\int \frac{e^\tau}{o(\tau)} d\tau = \tau + C \tag{3416}$$

$$\gamma + \tau = \tau + C \tag{3417}$$

$$\gamma + \tau + \frac{e^\tau}{o(\tau)} - \frac{1}{o(\tau)} = \tau + C + \frac{e^\tau}{e^\tau} - \frac{1}{e^\tau} \tag{3418}$$

$$\gamma + \tau + \frac{e^\tau}{o(\tau)} - \frac{1}{o(\tau)} = \int \frac{e^\tau}{o(\tau)} d\tau + \frac{e^\tau}{o(\tau)} - \frac{1}{o(\tau)} \tag{3419}$$

2.2.48 Derivation 91

$$\kappa(\nu) = \int \cos{(\nu)} d\nu \tag{3420}$$

$$\kappa(\nu) = \tau + \sin{(\nu)} \tag{3421}$$

$$\upsilon(\nu, \tau) = -\tau - \sin{(\nu)} + \frac{\tau + \sin{(\nu)}}{\tau} \tag{3422}$$

$$\upsilon(\nu, \tau) = -\tau - \sin{(\nu)} + \frac{\int \cos{(\nu)} d\nu}{\tau} \tag{3423}$$

2.2.49 Derivation 92

$$\zeta(\beta) = \log{(\beta)} \tag{3424}$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{d}{d\beta}\log{(\beta)} \tag{3425}$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{1}{\beta} \tag{3426}$$

$$\frac{\iint \tau \frac{d}{d\beta}\log{(\beta)} d\beta d\beta}{\log{(\beta)}} = \frac{\iint \tau \frac{1}{\beta} d\beta d\beta}{\log{(\beta)}} \tag{3427}$$

$$\frac{\iint \frac{\tau}{\beta} d\beta d\beta}{\log{(\beta)}} = \frac{\iint \frac{\tau}{\beta} d\beta d\beta}{\log{(\beta)}} \tag{3428}$$

2.2.50 Derivation 97

$$\alpha(\kappa) = e^{e^{\kappa}} \tag{3429}$$

$$\int \alpha(\kappa) d\kappa = \int e^{e^{\kappa}} d\kappa \tag{3430}$$

$$\int \alpha(\kappa) d\kappa = \nu + \operatorname{Ei}{(e^{\kappa})} \tag{3431}$$

$$2\int \alpha(\kappa) d\kappa = 2(\nu + \operatorname{Ei}{(e^{\kappa})}) \tag{3432}$$

$$2\int \alpha(\kappa) d\kappa = \iota + \operatorname{Ei}{(e^{\kappa})} + \int \alpha(\kappa) d\kappa \tag{3433}$$

2.3 Perturbation: EE

2.3.1 Derivation 1

$$\frac{d}{d\mathbf{s}}\sin{(\mathbf{s})} = \mathrm{J}_{\varepsilon}{(\mathbf{s})} \tag{3434}$$

$$-\sin{(\mathbf{s})} = -\frac{d}{d\mathbf{s}}\sin{(\mathbf{s})} \tag{3435}$$

$$-\sin{(\mathbf{s})} = \frac{d}{d\mathbf{s}}(-\sin{(\mathbf{s})}) \tag{3436}$$

$$-\sin{(\mathbf{s})} = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}{(\mathbf{s})} \tag{3437}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin{(\mathbf{s})} = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}{(\mathbf{s})} \tag{3438}$$

$$-\sin{(\mathbf{s})} = \frac{d^2}{d\mathbf{s}^2}\sin{(\mathbf{s})} \tag{3439}$$

2.3.2 Derivation 2

$$e^{\Psi_\lambda} = \mathbb{I}(\Psi_\lambda) \tag{3440}$$

$$\Psi_\lambda + \chi + e^{\Psi_\lambda} = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{3441}$$

$$\int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \int e^{\Psi_\lambda} d\Psi_\lambda \tag{3442}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \int e^{\Psi_\lambda} d\Psi_\lambda \tag{3443}$$

$$\Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda \tag{3444}$$

2.3.3 Derivation 3

$$\int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = m(\hat{x}_0, \mathbf{r}) \tag{3445}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0 m(\hat{x}_0, \mathbf{r}) \tag{3446}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{3447}$$

2.3.4 Derivation 4

$$\sin{(P_e)} = \mathrm{V}_{\mathbf{B}}{(P_e)} \tag{3448}$$

$$\frac{d}{dP_e}\sin{(P_e)} = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}{(P_e)} \tag{3449}$$

$$\cos{(P_e)} = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}{(P_e)} \tag{3450}$$

$$-1 + \frac{\cos{(P_e)}}{P_e} = -1 + \frac{\frac{d}{dP_e}\sin{(P_e)}}{P_e} \tag{3451}$$

2.3.5 Derivation 7

$$\sin(\mathbf{p}) = \mathrm{C_d}(\mathbf{p}) \tag{3452}$$

$$\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) = \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{3453}$$

$$\cos(\mathbf{p}) = \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{3454}$$

$$\int F_c \frac{d}{d\mathbf{p}}\sin(\mathbf{p}) dF_c = \int F_c \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) dF_c \tag{3455}$$

$$\int F_c \frac{d}{d\mathbf{p}}\sin(\mathbf{p}) dF_c = \int F_c \cos(\mathbf{p}) dF_c \tag{3456}$$

2.3.6 Derivation 8

$$-\sigma_x + \varphi = \mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) \tag{3457}$$

$$\frac{\partial}{\partial\varphi}(-\sigma_x + \varphi) = \frac{\partial}{\partial\varphi}\mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) \tag{3458}$$

$$0 = \frac{\partial^2}{\partial\varphi^2}\mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi) \tag{3459}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi)} = 1 \tag{3460}$$

$$1 = (e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f}_{\mathbf{p}}(\sigma_x, \varphi)})^{\sigma_x} \tag{3461}$$

2.3.7 Derivation 9

$$\frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) = \hat{p}_0(\phi, \mathbf{H}) \tag{3462}$$

$$1 = \hat{p}_0(\phi, \mathbf{H}) \tag{3463}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial\phi}1 \tag{3464}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{3465}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi) + \frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) - 1 = -3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi) - 1 \tag{3466}$$

2.3.8 Derivation 12

$$\log(\mathbf{g}) = \mathbf{B}(\mathbf{g}) \tag{3467}$$

$$\frac{d}{d\mathbf{g}}\log(\mathbf{g}) = \frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) \tag{3468}$$

$$\frac{1}{\mathbf{g}} = \frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) \tag{3469}$$

$$\cos(\frac{1}{\mathbf{g}}) = \cos(\frac{d}{d\mathbf{g}}\log(\mathbf{g})) \tag{3470}$$

2.3.9 Derivation 16

$$C_d = f(C_d) \tag{3471}$$

$$\frac{d}{dC_d}C_d = \frac{d}{dC_d}f(C_d) \tag{3472}$$

$$1 = \frac{d}{dC_d}f(C_d) \tag{3473}$$

$$\frac{1}{\frac{d}{df(C_d)}f(C_d)} = 1 \tag{3474}$$

2.3.10 Derivation 17

$$\cos(f') = \hat{X}(f') \tag{3475}$$

$$-\cos(f') = -\hat{X}(f') \tag{3476}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos(f') \tag{3477}$$

$$-\cos(f') = \frac{d^2}{d(f')^2}\hat{X}(f') \tag{3478}$$

$$-\frac{\cos(f')}{\mathrm{P_e}(f')} = \frac{-\hat{X}(f')}{\mathrm{P_e}(f')} \tag{3479}$$

$$-\frac{\cos(f')}{\mathrm{P_e}(f')} = \frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}(f')} \tag{3480}$$

2.3.11 Derivation 18

$$\log(P_e) = W(P_e) \tag{3481}$$

$$\frac{d}{dP_e}\log(P_e) = \frac{d}{dP_e}W(P_e) \tag{3482}$$

$$\frac{1}{P_e} = \frac{d}{dP_e}W(P_e) \tag{3483}$$

$$\int \frac{1}{P_e} dP_e = \int \frac{d}{dP_e}W(P_e) dP_e \tag{3484}$$

$$\int \frac{1}{P_e} dP_e = \int \frac{d}{dP_e}\log(P_e) dP_e \tag{3485}$$

2.3.12 Derivation 19

$$\int e^{\hat{H}_l} d\hat{H}_l = \mathrm{E}_\lambda\left(\hat{H}_l\right) \quad (3486)$$

$$\mathrm{E}_\lambda\left(\hat{H}_l\right) = \int e^{\hat{H}_l} d\hat{H}_l \quad (3487)$$

$$A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l} = A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l \quad (3488)$$

$$(A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l})^2 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \quad (3489)$$

$$(A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 = 0 \quad (3490)$$

2.3.13 Derivation 21

$$\int e^S dS = \mathrm{E}_\mathrm{n}\left(S\right) \quad (3491)$$

$$x + e^S = \mathrm{E}_\mathrm{n}\left(S\right) \quad (3492)$$

$$T + e^S = x + e^S \quad (3493)$$

$$\frac{T^2}{2} + Te^S + \psi^* = \int \mathrm{E}_\mathrm{n}\left(S\right) dT \quad (3494)$$

$$\frac{T^2}{2} + Te^S + t_2 = \frac{T^2}{2} + Te^S + \psi^* \quad (3495)$$

2.3.14 Derivation 23

$$\cos\left(e^\phi\right) = \mathbf{p}(\phi) \quad (3496)$$

$$\frac{d}{d\phi}\cos\left(e^\phi\right) = -e^\phi \sin\left(e^\phi\right) \quad (3497)$$

$$\frac{d}{d\phi}\mathbf{p}(\phi) = -e^\phi \sin\left(e^\phi\right) \quad (3498)$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos\left(e^\phi\right) d\phi \quad (3499)$$

$$\omega + \mathrm{Ci}\left(e^\phi\right) = \int \mathbf{p}(\phi) d\phi \quad (3500)$$

$$\frac{\partial}{\partial\phi}(\omega + \mathrm{Ci}\left(e^\phi\right)) = \frac{\partial}{\partial\phi}\int \mathbf{p}(\phi) d\phi \quad (3501)$$

$$\frac{\partial}{\partial\phi}\int(\omega + \mathrm{Ci}\left(e^\phi\right)) d\phi = \frac{d}{d\phi}\iint \mathbf{p}(\phi) d\phi d\phi \quad (3502)$$

2.3.15 Derivation 25

$$e^g = \theta_1(g) \quad (3503)$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g \quad (3504)$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^g = \frac{d}{dg}(\int e^g dg)^g \quad (3505)$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{d}{dg}(\int e^g dg)^g \quad (3506)$$

$$\frac{d}{dg}(\int e^g dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g \quad (3507)$$

2.3.16 Derivation 27

$$\int \log\left(x'\right) dx' = \phi(x') \quad (3508)$$

$$\frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') = \mathrm{t}_1\left(x', n_2\right) \quad (3509)$$

$$\frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') = \frac{d}{dx'}\phi(x') \quad (3510)$$

$$e^{-\frac{d}{dx'}\phi(x')}\frac{d}{dx'}\phi(x') = \mathrm{t}_1\left(x', n_2\right) e^{-\frac{d}{dx'}\phi(x')} \quad (3511)$$

2.3.17 Derivation 34

$$\frac{\mathbf{f}\varepsilon}{v_1} = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (3512)$$

$$\frac{\varepsilon}{v_1} = \frac{\dot{x}(v_1, \mathbf{f}, \varepsilon)}{\mathbf{f}} \quad (3513)$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\varepsilon}{v_1} = \frac{\partial}{\partial \mathbf{f}}\frac{\dot{x}(v_1, \mathbf{f}, \varepsilon)}{\mathbf{f}} \quad (3514)$$

$$\frac{\varepsilon}{v_1} = \frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (3515)$$

$$\mathbf{f}\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (3516)$$

2.3.18 Derivation 35

$$V = \lambda(V) \tag{3517}$$

$$0 = \frac{V \frac{d}{dV} \lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} \tag{3518}$$

$$0 = \frac{\frac{d}{dV} \lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} \tag{3519}$$

$$0 = \frac{\frac{d}{d\lambda(V)} \lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} \tag{3520}$$

2.3.19 Derivation 36

$$A + V - \dot{z} = \mathrm{f}'(\dot{z}, V, A) \tag{3521}$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \int (A + V - \dot{z}) dV \tag{3522}$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int \mathrm{f}'(\dot{z}, V, A) dV \tag{3523}$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int (A + V - \dot{z}) dV \tag{3524}$$

2.3.20 Derivation 37

$$e^{\mathbf{S}} = \mathrm{A_x}(\mathbf{S}) \tag{3525}$$

$$2e^{\mathbf{S}} = e^{\mathbf{S}} + e^{\mathbf{S}} \tag{3526}$$

$$2e^{\mathbf{S}} = e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} \mathrm{A_x}(\mathbf{S}) \tag{3527}$$

$$\frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} \mathrm{A_x}(\mathbf{S})) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + e^{\mathbf{S}}) \tag{3528}$$

$$\frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}} \mathrm{A_x}(\mathbf{S})) = \frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) \tag{3529}$$

2.3.21 Derivation 39

$$\mathbf{A} + \varepsilon_0 = M(\mathbf{A}, \varepsilon_0) \tag{3530}$$

$$\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \tag{3531}$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \tag{3532}$$

2.3.22 Derivation 41

$$e^{e^{\pi}} = \mathrm{F_x}(\pi) \tag{3533}$$

$$\int \mathrm{F_x}(\pi) d\pi = \int e^{e^{\pi}} d\pi \tag{3534}$$

$$P_g + \mathrm{Ei}(e^{\pi}) = \int \mathrm{F_x}(\pi) d\pi \tag{3535}$$

$$F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi) d\pi = 0 \tag{3536}$$

$$F_g - P_g = 0 \tag{3537}$$

2.3.23 Derivation 46

$$\sin(\lambda) = u(\lambda) \tag{3538}$$

$$n - \cos(\lambda) = \int u(\lambda) d\lambda \tag{3539}$$

$$n - \cos(\lambda) = \int \sin(\lambda) d\lambda \tag{3540}$$

$$-\frac{n - \cos(\lambda)}{\cos(\lambda)} = -\frac{\int \sin(\lambda) d\lambda}{\cos(\lambda)} \tag{3541}$$

2.3.24 Derivation 49

$$\int \log(f) df = \hat{x}(f) \tag{3542}$$

$$B + f \log(f) - f = \hat{x}(f) \tag{3543}$$

$$f + \int \log(f) df = B + f \log(f) \tag{3544}$$

2.3.25 Derivation 50

$$C_2 = \mathbf{v}(C_2) \tag{3545}$$

$$\frac{C_2^2}{2} + v = \int \mathbf{v}(C_2) dC_2 \tag{3546}$$

$$v + \frac{\mathbf{v}^2(C_2)}{2} = \mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} \tag{3547}$$

$$\frac{C_2^2}{2} + v = \frac{C_2^2}{2} + \mathbf{p} \tag{3548}$$

2.3.26 Derivation 51

$$\log(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) \tag{3549}$$

$$\mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = a(\mathbf{s}) \tag{3550}$$

$$\mathbf{s}\log(\mathbf{s}) - \mathbf{s} + \omega = \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{3551}$$

$$-\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) = a(\mathbf{s}) \tag{3552}$$

2.3.27 Derivation 53

$$e^A = \mathrm{A_y}(A) \tag{3553}$$

$$(e^A)^A = (\mathrm{A_y}(A))^A \tag{3554}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \frac{d}{dA}e^A \tag{3555}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = (e^A)^A \tag{3556}$$

$$\mathrm{A_y}^A(A) = (\frac{d}{dA}\mathrm{A_y}(A))^A \tag{3557}$$

2.3.28 Derivation 54

$$\frac{r_0}{\mathbf{P}} = E(r_0, \mathbf{P}) \tag{3558}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} \tag{3559}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{3560}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} \tag{3561}$$

2.3.29 Derivation 56

$$\sin(\psi^*) = C(\psi^*) \tag{3562}$$

$$\frac{d}{d\psi^*}\sin(\psi^*) = \frac{d}{d\psi^*}C(\psi^*) \tag{3563}$$

$$\cos(\psi^*) = \frac{d}{d\psi^*}C(\psi^*) \tag{3564}$$

$$\sin(\psi^*) + \cos(\psi^*) = C(\psi^*) + \cos(\psi^*) \tag{3565}$$

2.3.30 Derivation 57

$$\frac{C_2 f_{\mathbf{p}}}{y} = \phi(C_2, y, f_{\mathbf{p}}) \tag{3566}$$

$$\frac{C_2 f_{\mathbf{p}}}{y} = \hat{x}_0(C_2, y, f_{\mathbf{p}}) \tag{3567}$$

$$\phi(C_2, y, f_{\mathbf{p}}) = \hat{x}_0(C_2, y, f_{\mathbf{p}}) \tag{3568}$$

$$\frac{f_{\mathbf{p}}}{y} = \frac{1}{C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{3569}$$

$$\frac{\partial}{\partial C_2}\frac{f_{\mathbf{p}}}{y} = \frac{\partial}{\partial C_2}\frac{1}{C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{3570}$$

$$\frac{f_{\mathbf{p}}}{y} = \frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{3571}$$

$$C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \hat{x}_0(C_2, y, f_{\mathbf{p}}) \tag{3572}$$

2.3.31 Derivation 58

$$\frac{1}{t_2} = \mathrm{E_x}(t_2) \tag{3573}$$

$$t_2\,\mathrm{E_x}(t_2) = 1 \tag{3574}$$

$$\int t_2\,\mathrm{E_x}(t_2) dt_2 = \int dt_2 \tag{3575}$$

$$C_1 + \log(t_2) = \int \mathrm{E_x}(t_2) dt_2 \tag{3576}$$

$$(\int \mathrm{E_x}(t_2) dt_2)^{t_2} = (C_1 + \log(t_2))^{t_2} \tag{3577}$$

2.3.32 Derivation 59

$$\log(\psi^*) = \mathrm{M_E}(\psi^*) \tag{3578}$$

$$\frac{d}{d\psi^*}\log(\psi^*) = \frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) \tag{3579}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) \tag{3580}$$

$$(((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} \tag{3581}$$

2.3.33 Derivation 60

$$e^u = H(u) \tag{3582}$$

$$\frac{e^u}{H(u)} = 1 \tag{3583}$$

$$\int \frac{e^u}{H(u)} du = \int 1 du \tag{3584}$$

$$\int \frac{e^u}{H(u)} du = A_x + u \tag{3585}$$

$$-\int \frac{e^u}{H(u)} du = -(A_x + u) \tag{3586}$$

$$-\int \frac{e^u}{H(u)} du = -A_x - u \tag{3587}$$

2.3.34 Derivation 61

$$\frac{\partial}{\partial s}(\mathbf{M} + s) = q(\mathbf{M}, s) \tag{3588}$$

$$0 = \frac{\partial}{\partial s} q(\mathbf{M}, s) \tag{3589}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = \frac{\partial}{\partial s} q(\mathbf{M}, s) \tag{3590}$$

$$0 = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{3591}$$

2.3.35 Derivation 64

$$\log(q) = \delta(q) \tag{3592}$$

$$A_2 + q \log(q) - q - \int \delta(q) dq = 0 \tag{3593}$$

$$A_2 - m_s + q\delta(q) - q \log(q) = 0 \tag{3594}$$

$$\frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log(q)) = \frac{d}{dA_2} 0 \tag{3595}$$

2.3.36 Derivation 65

$$\cos(\phi_2) = \mathrm{A_y}(\phi_2) \tag{3596}$$

$$\frac{d}{d\phi_2}\cos(\phi_2) = \frac{d}{d\phi_2}\mathrm{A_y}(\phi_2) \tag{3597}$$

$$-\sin(\phi_2) = \frac{d}{d\phi_2}\mathrm{A_y}(\phi_2) \tag{3598}$$

$$\frac{d^2}{d\phi_2^2} - \sin(\phi_2) = \frac{d^3}{d\phi_2^3}\cos(\phi_2) \tag{3599}$$

2.3.37 Derivation 67

$$\frac{d}{d\varphi^*} e^{\varphi^*} = l(\varphi^*) \tag{3600}$$

$$\int \frac{d}{d\varphi^*} e^{\varphi^*} d\varphi^* = \int l(\varphi^*) d\varphi^* \tag{3601}$$

$$e^{\varphi^*} = l(\varphi^*) \tag{3602}$$

$$\frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} = \frac{d}{d\varphi^*} l(\varphi^*) \tag{3603}$$

$$\frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} - 1 = \frac{d}{d\varphi^*} l(\varphi^*) - 1 \tag{3604}$$

$$\frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{3605}$$

2.3.38 Derivation 70

$$\cos(U) = \hat{\mathbf{r}}(U) \tag{3606}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2(U) \tag{3607}$$

$$\int \hat{\mathbf{r}}^2(U) dU = \int \cos^2(U) dU \tag{3608}$$

$$\frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} = \int \hat{\mathbf{r}}^2(U) dU \tag{3609}$$

$$\int \cos^2(U) dU = \frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} \tag{3610}$$

2.3.39 Derivation 71

$$G - L = \mathrm{v_x}(G, L) \tag{3611}$$

$$\frac{\partial}{\partial G}(G - L) = \frac{\partial}{\partial G}\mathrm{v_x}(G, L) \tag{3612}$$

$$1 = \frac{\partial}{\partial G}\mathrm{v_x}(G, L) \tag{3613}$$

$$1 = (((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G \tag{3614}$$

2.3.40 Derivation 72

$$\cos{(\theta_1)} = \mathrm{A}_1{(\theta_1)} \tag{3615}$$

$$\mathrm{A}_1{(\theta_1)}\cos{(\theta_1)} = \cos^2{(\theta_1)} \tag{3616}$$

$$\int \mathrm{A}_1{(\theta_1)}\cos{(\theta_1)}d\theta_1 = \int \cos^2{(\theta_1)}d\theta_1 \tag{3617}$$

$$\int \cos^2{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} \tag{3618}$$

2.3.41 Derivation 74

$$s(\mathbf{J}_P + \rho_b) = \Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{3619}$$

$$\frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{3620}$$

$$\mathbf{J}_P + \rho_b = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{3621}$$

$$\frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{3622}$$

2.3.42 Derivation 75

$$\sin{(F_N)} = \mathrm{A_z}{(F_N)} \tag{3623}$$

$$(\int \mathrm{A_z}{(F_N)}dF_N)^2 = \mathbf{v}(F_N) \tag{3624}$$

$$(\int \sin{(F_N)}dF_N)^2 = \mathbf{v}(F_N) \tag{3625}$$

$$(Q - \cos{(F_N)})^2 = \mathbf{v}(F_N) \tag{3626}$$

$$(Q - \cos{(F_N)})^2 = (\int \sin{(F_N)}dF_N)^2 \tag{3627}$$

2.3.43 Derivation 76

$$\sin{(\hat{X})} = r(\hat{X}) \tag{3628}$$

$$\frac{d}{d\hat{X}}\sin{(\hat{X})} = \frac{d}{d\hat{X}}r(\hat{X}) \tag{3629}$$

$$\cos{(\hat{X})} = \frac{d}{d\hat{X}}r(\hat{X}) \tag{3630}$$

$$\frac{d^2}{d\hat{X}^2}\sin{(\hat{X})} = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{3631}$$

$$-\sin{(\hat{X})} = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{3632}$$

2.3.44 Derivation 78

$$\cos{(L_\varepsilon)} = \dot{z}(L_\varepsilon) \tag{3633}$$

$$\sin{(L_\varepsilon)} = \int \dot{z}(L_\varepsilon)dL_\varepsilon \tag{3634}$$

$$\pi + \sin{(L_\varepsilon)} + 1 = \int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 \tag{3635}$$

$$(\pi + \sin{(L_\varepsilon)} + 1)^\pi = (\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1)^\pi \tag{3636}$$

$$r_0 = \pi \tag{3637}$$

$$(r_0 + \sin{(L_\varepsilon)} + 1)^\pi = (r_0 + \sin{(L_\varepsilon)} + 1)^\pi \tag{3638}$$

2.3.45 Derivation 81

$$\int \sin{(\hat{H}_l)}d\hat{H}_l = \mathbf{F}(\hat{H}_l) \tag{3639}$$

$$V - \int \sin{(\hat{H}_l)}d\hat{H}_l = V - \mathbf{F}(\hat{H}_l) \tag{3640}$$

$$V - \cos{(\hat{H}_l)} = \mathbf{F}(\hat{H}_l) \tag{3641}$$

$$-C + \cos{(\hat{H}_l)} = -\mathbf{F}(\hat{H}_l) \tag{3642}$$

$$(-V + \cos{(\hat{H}_l)})^C = (-\mathbf{F}(\hat{H}_l))^C \tag{3643}$$

2.3.46 Derivation 82

$$\frac{d}{d\mathbf{J}_f}\sin{(\mathbf{J}_f)} = \mathrm{f}'{(\mathbf{J}_f)} \tag{3644}$$

$$\cos{(\mathbf{J}_f)} = \mathrm{f}'{(\mathbf{J}_f)} \tag{3645}$$

$$\sin{(\mathbf{J}_f)}\cos{(\mathbf{J}_f)} = \mathrm{f}'{(\mathbf{J}_f)}\sin{(\mathbf{J}_f)} \tag{3646}$$

2.3.47 Derivation 90

$$e^\mu = \omega(\mu) \tag{3647}$$

$$\frac{e^\mu}{\omega(\mu)} = 1 \tag{3648}$$

$$\int \frac{e^\mu}{\omega(\mu)}d\mu = \int 1 d\mu \tag{3649}$$

$$\int \frac{e^\mu}{\omega(\mu)}d\mu = \mathbf{J} + \mu \tag{3650}$$

$$\int \frac{e^\mu}{\omega(\mu)}d\mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{3651}$$

2.3.48 Derivation 91

$$\int \cos{(q)} dq = \mathrm{v_t}\left(q\right) \tag{3652}$$

$$E + \sin{(q)} = \mathrm{v_t}\left(q\right) \tag{3653}$$

$$- E - \sin{(q)} + \frac{E + \sin{(q)}}{E} = \mathrm{y}'\left(q, E\right) \tag{3654}$$

$$- E - \sin{(q)} + \frac{\int \cos{(q)} dq}{E} = \mathrm{y}'\left(q, E\right) \tag{3655}$$

2.3.49 Derivation 92

$$\log{(q)} = \mathbf{J}(q) \tag{3656}$$

$$\frac{d}{dq} \log{(q)} = \frac{d}{dq} \mathbf{J}(q) \tag{3657}$$

$$\frac{1}{q} = \frac{d}{dq} \mathbf{J}(q) \tag{3658}$$

$$\frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log{(q)}} = \frac{\iint \mathbf{v} \frac{d}{dq} \log{(q)} dq dq}{\log{(q)}} \tag{3659}$$

2.3.50 Derivation 97

$$e^{e^{F_g}} = \mathbf{J}_f(F_g) \tag{3660}$$

$$\frac{d}{dF_g} e^{e^{F_g}} = \frac{d}{dF_g} \mathbf{J}_f(F_g) \tag{3661}$$

$$\frac{d}{dF_g} e^{e^{F_g}} = e^{F_g} e^{e^{F_g}} \tag{3662}$$

$$\int \frac{d}{dF_g} e^{e^{F_g}} dF_g = \int e^{F_g} e^{e^{F_g}} dF_g \tag{3663}$$

$$h + \operatorname{Ei}{(e^{F_g})} = \int \mathbf{J}_f(F_g) dF_g \tag{3664}$$

$$z^* + \operatorname{Ei}{(e^{F_g})} + \int \mathbf{J}_f(F_g) dF_g = 2 \int \mathbf{J}_f(F_g) dF_g \tag{3665}$$

2.4 Perturbation: AG

2.4.1 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}} \sin{(\mathbf{s})} \tag{3666}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d^2}{d\mathbf{s}^2} \sin{(\mathbf{s})} \tag{3667}$$

$$\frac{d^2}{d\mathbf{s}^2} \sin{(\mathbf{s})} = - \sin{(\mathbf{s})} \tag{3668}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = - \sin{(\mathbf{s})} \tag{3669}$$

$$\mathbf{s} + \frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \mathbf{s} - \sin{(\mathbf{s})} \tag{3670}$$

2.4.2 Derivation 2

$$\mathbb{I}(\Psi_\lambda) = e^{\Psi_\lambda} \tag{3671}$$

$$\int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \int e^{\Psi_\lambda} d\Psi_\lambda \tag{3672}$$

$$\int e^{\Psi_\lambda} d\Psi_\lambda = \chi + e^{\Psi_\lambda} \tag{3673}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \chi + e^{\Psi_\lambda} \tag{3674}$$

$$\Psi_\lambda + \int e^{\Psi_\lambda} d\Psi_\lambda = \Psi_\lambda + \chi + e^{\Psi_\lambda} \tag{3675}$$

2.4.3 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{3676}$$

$$\int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r} \tag{3677}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{3678}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 (\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r}) \tag{3679}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{x}_0 (\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r}) \tag{3680}$$

2.4.4 Derivation 4

$$\mathrm{V_{\mathbf{B}}}\left(P_e\right) = \sin\left(P_e\right) \tag{3681}$$

$$\frac{d}{dP_e}\mathrm{V_{\mathbf{B}}}\left(P_e\right) = \frac{d}{dP_e}\sin\left(P_e\right) \tag{3682}$$

$$\frac{d}{dP_e}\mathrm{V_{\mathbf{B}}}\left(P_e\right) = \cos\left(P_e\right) \tag{3683}$$

$$\frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = \frac{\frac{d}{dP_e}\mathrm{V_{\mathbf{B}}}\left(P_e\right)}{P_e} \tag{3684}$$

2.4.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{3685}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{3686}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{3687}$$

$$\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{3688}$$

2.4.6 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{3689}$$

$$\frac{\partial}{\partial\varphi}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 1 \tag{3690}$$

$$\frac{\partial^2}{\partial\varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{3691}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}(-\sigma_x+\varphi)} = e^0 \tag{3692}$$

$$e^{\frac{\partial^2}{\partial\varphi^2}(-\sigma_x+\varphi)} = 1 \tag{3693}$$

2.4.7 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) \tag{3694}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{3695}$$

$$0 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi, \mathbf{H}) \tag{3696}$$

$$0 = \frac{\partial}{\partial\phi}1 \tag{3697}$$

$$0^{\mathbf{H}} = \left(\frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi)\right)^{\mathbf{H}} \tag{3698}$$

2.4.8 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log\left(\mathbf{g}\right) \tag{3699}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{3700}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{3701}$$

$$\frac{d}{d\mathbf{g}}\cos\left(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})\right) = \frac{d}{d\mathbf{g}}\cos\left(\frac{1}{\mathbf{g}}\right) \tag{3702}$$

2.4.9 Derivation 16

$$f(C_d) = C_d \tag{3703}$$

$$\frac{d}{dC_d}f(C_d) = \frac{d}{dC_d}C_d \tag{3704}$$

$$\frac{d}{dC_d}f(C_d) = 1 \tag{3705}$$

$$\frac{1}{\frac{d}{dC_d}C_d} = 1 \tag{3706}$$

$$2 = 1 + \frac{1}{\frac{d}{dC_d}C_d} \tag{3707}$$

2.4.10 Derivation 17

$$\hat{X}(f') = \cos\left(f'\right) \tag{3708}$$

$$\frac{d}{d(f')}\hat{X}(f') = -\sin\left(f'\right) \tag{3709}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d}{d(f')}(-\sin\left(f'\right)) \tag{3710}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos\left(f'\right) \tag{3711}$$

$$\frac{d^2}{d(f')^2}\cos\left(f'\right) = -\cos\left(f'\right) \tag{3712}$$

2.4.11 Derivation 18

$$W(P_e) = \log\left(P_e\right) \tag{3713}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log\left(P_e\right) \tag{3714}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{3715}$$

$$-P_e + \frac{d}{dP_e}\log\left(P_e\right) = -P_e + \frac{1}{P_e} \tag{3716}$$

2.4.12 Derivation 19

$$\mathrm{E}_{\lambda}(\hat{H}_l) = \int e^{\hat{H}_l} d\hat{H}_l \quad (3717)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_{\lambda}(\hat{H}_l) + e^{\hat{H}_l})^2 \quad (3718)$$

$$0 = (A_y + e^{\hat{H}_l})^2(A_y - \mathrm{E}_{\lambda}(\hat{H}_l) + e^{\hat{H}_l})^4 \quad (3719)$$

2.4.13 Derivation 21

$$\mathrm{E}_{\mathrm{n}}(S) = \int e^S dS \quad (3720)$$

$$\mathrm{E}_{\mathrm{n}}(S) = x + e^S \quad (3721)$$

$$x + e^S = T + e^S \quad (3722)$$

$$\int \mathrm{E}_{\mathrm{n}}(S) dT = \int (T + e^S) dT \quad (3723)$$

$$\int \mathrm{E}_{\mathrm{n}}(S) dT = \frac{T^2}{2} + Te^S + \psi^* \quad (3724)$$

$$\frac{T^2}{2} + Te^S + \psi^* = \frac{T^2}{2} + Te^S + \mathbf{S} \quad (3725)$$

2.4.14 Derivation 23

$$\mathbf{p}(\phi) = \cos(e^{\phi}) \quad (3726)$$

$$\frac{d}{d\phi}\mathbf{p}(\phi) = -e^{\phi}\sin(e^{\phi}) \quad (3727)$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos(e^{\phi}) d\phi \quad (3728)$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}(e^{\phi}) \quad (3729)$$

$$\int \mathbf{p}(\phi) d\phi = \mathrm{Ci}(e^{\phi}) \quad (3730)$$

2.4.15 Derivation 25

$$\theta_1(g) = e^g \quad (3731)$$

$$\frac{d}{dg}\theta_1(g) = e^g \quad (3732)$$

$$\int \theta_1(g) dg = \int e^g dg \quad (3733)$$

$$\int \theta_1(g) dg = e^g + \mathbf{g} \quad (3734)$$

$$(\int \theta_1(g) dg)^g = (\mathbf{g} + e^g)^g \quad (3735)$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \quad (3736)$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{\partial}{\partial g}(L + e^g)^g \quad (3737)$$

2.4.16 Derivation 27

$$\phi(x') = \int \log(x') dx' \quad (3738)$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log(x') dx' \quad (3739)$$

$$\frac{d}{dx'}\phi(x') = \log(x') \quad (3740)$$

$$\mathrm{t}_1(x', n_2) = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \quad (3741)$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log(x') - x') \quad (3742)$$

$$\frac{\mathrm{t}_1(x', n_2)}{n_2 + x'\log(x') - x'} = \frac{\frac{d}{dx'}\phi(x')}{n_2 + x'\log(x') - x'} \quad (3743)$$

2.4.17 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \quad (3744)$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \quad (3745)$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\varepsilon}{v_1} \quad (3746)$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\varepsilon}{v_1} \quad (3747)$$

2.4.18 Derivation 35

$$\lambda(V) = V \tag{3748}$$

$$\frac{d}{dV}\lambda(V) = \frac{d}{dV}V \tag{3749}$$

$$\frac{d}{dV}\lambda(V) = 1 \tag{3750}$$

$$\frac{V\frac{d}{dV}\lambda(V)}{\lambda^2(V)} - \frac{1}{\lambda(V)} = \frac{V(1)}{V^2} - \frac{1}{V} \tag{3751}$$

$$\frac{V}{V^2} - \frac{1}{V} = 0 \tag{3752}$$

$$V(\frac{\frac{d}{dV}V}{V} - \frac{1}{V}) = 0 \tag{3753}$$

2.4.19 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = A + V - \dot{z} \tag{3754}$$

$$\int \mathrm{f}'(\dot{z}, V, A)dV = \int (A + V - \dot{z})dV \tag{3755}$$

$$\int \mathrm{f}'(\dot{z}, V, A)dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{3756}$$

$$\iint \mathrm{f}'(\dot{z}, V, A)dVdV = \int (\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A})dV \tag{3757}$$

2.4.20 Derivation 37

$$\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} \tag{3758}$$

$$\frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) = \frac{d}{d\mathbf{S}}e^{\mathbf{S}} \tag{3759}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}e^{\mathbf{S}} \tag{3760}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}e^{\mathbf{S}} = 2e^{\mathbf{S}} \tag{3761}$$

2.4.21 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{3762}$$

$$\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0)d\mathbf{A} \tag{3763}$$

$$\int (\mathbf{A} + \varepsilon_0)d\mathbf{A} = \frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x \tag{3764}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{3765}$$

$$(\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{3766}$$

2.4.22 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{3767}$$

$$\int \mathrm{F_x}(\pi)d\pi = \int e^{e^{\pi}}d\pi \tag{3768}$$

$$\int \mathrm{F_x}(\pi)d\pi = P_g + \mathrm{Ei}(e^{\pi}) \tag{3769}$$

$$0 = F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi \tag{3770}$$

$$\int 0d\pi = \int (F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi)d\pi \tag{3771}$$

2.4.23 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{3772}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{3773}$$

$$\int u(\lambda)d\lambda = -\cos(\lambda) + C \tag{3774}$$

$$\int u(\lambda)d\lambda = n - \cos(\lambda) \tag{3775}$$

$$\iint \sin(\lambda)d\lambda dn = \int (n - \cos(\lambda))dn \tag{3776}$$

2.4.24 Derivation 49

$$\hat{x}(f) = \int \log{(f)} df \tag{3777}$$

$$\int \log{(f)} df = B + f \log{(f)} - f \tag{3778}$$

$$\hat{x}(f) = B + f \log{(f)} - f \tag{3779}$$

$$(B + f \log{(f)} - f)^2 = (B + f \log{(f)} - f) \int \log{(f)} df \tag{3780}$$

2.4.25 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{3781}$$

$$\int \mathbf{v}(C_2) dC_2 = \int C_2 dC_2 \tag{3782}$$

$$\int \mathbf{v}(C_2) dC_2 = \frac{C_2^2}{2} + v \tag{3783}$$

$$\mathbf{v}^2(C_2) = C_2^2 \tag{3784}$$

$$\frac{\mathbf{v}^2(C_2)}{2} = \frac{C_2^2}{2} \tag{3785}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{3786}$$

$$\mathbf{p} + v + \mathbf{v}^2(C_2) = 2v + \mathbf{v}^2(C_2) \tag{3787}$$

2.4.26 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log{(\mathbf{s})} \tag{3788}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{3789}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log{(\mathbf{s})} d\mathbf{s} \tag{3790}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s} \log{(\mathbf{s})} - \mathbf{s} + \omega \tag{3791}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \log{(\mathbf{s})} d\mathbf{s} \tag{3792}$$

2.4.27 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{3793}$$

$$\frac{d}{dA} \mathrm{A_y}(A) = \frac{d}{dA} e^A \tag{3794}$$

$$\frac{d}{dA} \mathrm{A_y}(A) = e^A \tag{3795}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = (e^A)^A \tag{3796}$$

$$\frac{(\frac{d}{dA} e^A)^A}{\frac{d}{dA} \mathrm{A_y}(A)} = \frac{(e^A)^A}{\frac{d}{dA} \mathrm{A_y}(A)} \tag{3797}$$

2.4.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{3798}$$

$$\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) = -\frac{r_0}{\mathbf{P}^2} \tag{3799}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} = -\frac{r_0}{\mathbf{P}^3} \tag{3800}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = \frac{r_0}{\mathbf{P}^3} \tag{3801}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{3802}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{3803}$$

2.4.29 Derivation 56

$$C(\psi^*) = \sin{(\psi^*)} \tag{3804}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \frac{d}{d\psi^*} \sin{(\psi^*)} \tag{3805}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \cos{(\psi^*)} \tag{3806}$$

$$\sin{(\psi^*)} + \frac{d}{d\psi^*} C(\psi^*) = \sin{(\psi^*)} + \cos{(\psi^*)} \tag{3807}$$

$$\frac{\sin{(\psi^*)} + \frac{d}{d\psi^*} C(\psi^*)}{C(\psi^*) + \frac{d}{d\psi^*} C(\psi^*)} = \frac{\sin{(\psi^*)} + \cos{(\psi^*)}}{\sin{(\psi^*)} + \cos{(\psi^*)}} \tag{3808}$$

$$1 = \frac{\sin{(\psi^*)} + \frac{d}{d\psi^*} C(\psi^*)}{C(\psi^*) + \frac{d}{d\psi^*} C(\psi^*)} \tag{3809}$$

2.4.30 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{3810}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{3811}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{3812}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{3813}$$

$$\frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} = \frac{f_{\mathbf{p}}}{y} \tag{3814}$$

2.4.31 Derivation 58

$$\mathrm{E_x}\left(t_2\right) = \frac{1}{t_2} \tag{3815}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = \int \frac{1}{t_2} dt_2 \tag{3816}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(t_2\right) \tag{3817}$$

$$(C_1 + \log(\frac{1}{\mathrm{E_x}\left(t_2\right)}))^{\frac{1}{\mathrm{E_x}\left(t_2\right)}} = (\int \frac{1}{t_2} dt_2)^{\frac{1}{\mathrm{E_x}\left(t_2\right)}} \tag{3818}$$

2.4.32 Derivation 59

$$\mathrm{M_E}\left(\psi^*\right) = \log\left(\psi^*\right) \tag{3819}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{d}{d\psi^*}\log\left(\psi^*\right) \tag{3820}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) = \frac{1}{\psi^*} \tag{3821}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right))^{\psi^*})^{\psi^*} \tag{3822}$$

2.4.33 Derivation 60

$$H(u) = e^u \tag{3823}$$

$$\frac{e^u}{H(u)} = \frac{e^u}{e^u} \tag{3824}$$

$$\frac{e^u}{H(u)} = 1 \tag{3825}$$

$$\int \frac{e^u}{H(u)} du = \int 1 du \tag{3826}$$

$$A_x + u = \int 1 du \tag{3827}$$

2.4.34 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{3828}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{3829}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = 0 \tag{3830}$$

$$(\frac{\partial}{\partial s}q(\mathbf{M}, s))^{\mathbf{M}} = 0^{\mathbf{M}} \tag{3831}$$

2.4.35 Derivation 64

$$\delta(q) = \log\left(q\right) \tag{3832}$$

$$0 = A_2 + q\log\left(q\right) - q - \int \delta(q) dq \tag{3833}$$

$$0 = A_2 - m_s + q\delta(q) - q\log\left(q\right) \tag{3834}$$

$$0^q = (A_2 - m_s + q\delta(q) - q\log\left(q\right))^q \tag{3835}$$

2.4.36 Derivation 65

$$\mathrm{A_y}\left(\phi_2\right) = \cos\left(\phi_2\right) \tag{3836}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) = \frac{d}{d\phi_2}\cos\left(\phi_2\right) \tag{3837}$$

$$\frac{d}{d\phi_2}\mathrm{A_y}\left(\phi_2\right) = -\sin\left(\phi_2\right) \tag{3838}$$

$$\frac{d^2}{d\phi_2^2}\cos\left(\phi_2\right) = \frac{d}{d\phi_2} - \sin\left(\phi_2\right) \tag{3839}$$

$$\sin\left(\phi_2\right) + \frac{d^2}{d\phi_2^2}\cos\left(\phi_2\right) = \sin\left(\phi_2\right) + \frac{d}{d\phi_2} - \sin\left(\phi_2\right) \tag{3840}$$

2.4.37 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{3841}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{3842}$$

$$e^{\varphi^*} + 1 = \frac{d}{d\varphi^*}e^{\varphi^*} + 1 \tag{3843}$$

2.4.38 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos{(U)} \tag{3844}$$

$$\hat{\mathbf{r}}^2(U) = \cos^2{(U)} \tag{3845}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \int \cos^2{(U)}dU \tag{3846}$$

$$\int \hat{\mathbf{r}}^2(U)dU = \frac{U}{2} + y + \frac{\sin{(U)}\cos{(U)}}{2} \tag{3847}$$

$$-\frac{U}{2} + \int \hat{\mathbf{r}}^2(U)dU = y + \frac{\sin{(U)}\cos{(U)}}{2} \tag{3848}$$

2.4.39 Derivation 71

$$\mathrm{v_x}\,(G, L) = G - L \tag{3849}$$

$$\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = \frac{\partial}{\partial G}(G - L) \tag{3850}$$

$$\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = 1 \tag{3851}$$

$$((\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L))^G)^G + \frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = (1^G)^G + 1 \tag{3852}$$

$$((\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L))^G)^G + \frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = \frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) + 1 \tag{3853}$$

2.4.40 Derivation 72

$$\mathrm{A_1}\,(\theta_1) = \cos{(\theta_1)} \tag{3854}$$

$$\int \mathrm{A_1}\,(\theta_1)\cos{(\theta_1)}d\theta_1 = \int \cos^2{(\theta_1)}d\theta_1 \tag{3855}$$

$$\int \mathrm{A_1}\,(\theta_1)\cos{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} \tag{3856}$$

$$\int \mathrm{A_1}\,(\theta_1)\cos{(\theta_1)}d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\mathrm{A_1}\,(\theta_1)\sin{(\theta_1)}}{2} \tag{3857}$$

2.4.41 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{3858}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}(s(\mathbf{J}_P + \rho_b)) \tag{3859}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{3860}$$

$$\int \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)ds = \int (\mathbf{J}_P + \rho_b)ds \tag{3861}$$

2.4.42 Derivation 75

$$\mathrm{A_z}\,(F_N) = \sin{(F_N)} \tag{3862}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}\,(F_N)dF_N)^2 \tag{3863}$$

$$\mathbf{v}(F_N) = (\int \sin{(F_N)}dF_N)^2 \tag{3864}$$

$$\mathbf{v}(F_N) = (Q - \cos{(F_N)})^2 \tag{3865}$$

$$(\int \sin{(F_N)}dF_N)^2 = (Q - \cos{(F_N)})^2 \tag{3866}$$

2.4.43 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{3867}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin{(\hat{X})} \tag{3868}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos{(\hat{X})} \tag{3869}$$

$$\frac{d^2}{d\hat{X}^2}\sin{(\hat{X})} = \frac{d}{d\hat{X}}\cos{(\hat{X})} \tag{3870}$$

2.4.44 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{3871}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \int \cos(L_\varepsilon) dL_\varepsilon \tag{3872}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \sin(L_\varepsilon) + C \tag{3873}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \sin(L_\varepsilon) + C + 1 \tag{3874}$$

$$\pi + \sin(L_\varepsilon) + 1 = \sin(L_\varepsilon) + C + 1 \tag{3875}$$

$$g_\varepsilon = \pi \tag{3876}$$

$$(g_\varepsilon + \sin(L_\varepsilon) + 1)^\pi = (\pi + \sin(L_\varepsilon) + 1)^\pi \tag{3877}$$

2.4.45 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l) d\hat{H}_l \tag{3878}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{3879}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{3880}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{3881}$$

$$(-\int \sin(\hat{H}_l) d\hat{H}_l)^C = (-C + \cos(\hat{H}_l))^C \tag{3882}$$

2.4.46 Derivation 82

$$\mathrm{f}'(\mathbf{J}_f) = \frac{d}{d\mathbf{J}_f} \sin(\mathbf{J}_f) \tag{3883}$$

$$\mathrm{f}'(\mathbf{J}_f) = \cos(\mathbf{J}_f) \tag{3884}$$

$$\frac{d}{d\mathbf{J}_f} \cos(\mathbf{J}_f) = \frac{d^2}{d\mathbf{J}_f^2} \sin(\mathbf{J}_f) \tag{3885}$$

2.4.47 Derivation 90

$$\omega(\mu) = e^\mu \tag{3886}$$

$$\frac{e^\mu}{\omega(\mu)} = \frac{e^\mu}{e^\mu} \tag{3887}$$

$$\frac{e^\mu}{\omega(\mu)} = 1 \tag{3888}$$

$$\int \frac{e^\mu}{\omega(\mu)} d\mu = \int 1 d\mu \tag{3889}$$

$$\mathbf{J} + \mu = \int \frac{e^\mu}{\omega(\mu)} d\mu \tag{3890}$$

$$(\mathbf{J}+\mu)(\mathbf{J}+\mu-\frac{1}{\omega(\mu)}) = (\mathbf{J}+\mu)(\int \frac{e^\mu}{\omega(\mu)} d\mu - \frac{1}{\omega(\mu)}) \tag{3891}$$

2.4.48 Derivation 91

$$\mathrm{v_t}(q) = \int \cos(q) dq \tag{3892}$$

$$\mathrm{y}'(q, E) = -E - \sin(q) + \frac{E + \sin(q)}{E} \tag{3893}$$

$$\mathrm{v_t}(q) = E + \sin(q) \tag{3894}$$

$$\int \mathrm{y}'(q, E) dE = \int (-E - \sin(q) + \frac{E + \sin(q)}{E}) dE \tag{3895}$$

2.4.49 Derivation 92

$$\mathbf{J}(q) = \log(q) \tag{3896}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq} \log(q) \tag{3897}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{1}{q} \tag{3898}$$

$$\frac{d}{dq} \log(q) = \frac{1}{q} \tag{3899}$$

$$(\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq)^q = (\iint \mathbf{v} \frac{1}{q} dq dq)^q \tag{3900}$$

2.4.50 Derivation 97

$$\mathbf{J}_f(F_g) = e^{e^{F_g}} \tag{3901}$$

$$\int \mathbf{J}_f(F_g) dF_g = \int e^{e^{F_g}} dF_g \tag{3902}$$

$$\int \mathbf{J}_f(F_g) dF_g = h + \operatorname{Ei}\left(e^{F_g}\right) \tag{3903}$$

$$2 \int \mathbf{J}_f(F_g) dF_g = 2(h + \operatorname{Ei}\left(e^{F_g}\right)) \tag{3904}$$

$$2h + 2\operatorname{Ei}\left(e^{F_g}\right) = h + \operatorname{Ei}\left(e^{F_g}\right) + \int e^{e^{F_g}} dF_g \tag{3905}$$

2.5 Perturbation: SR

2.5.1 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}} \sin\left(\mathbf{s}\right) \tag{3906}$$

$$\frac{d^2}{d\mathbf{s}^2} \sin\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) \tag{3907}$$

$$\frac{d^2}{d\mathbf{s}^2} \sin\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}} \frac{d}{d\mathbf{s}} \sin\left(\mathbf{s}\right) \tag{3908}$$

$$\frac{d^2}{d\mathbf{s}^2} \sin\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{3909}$$

2.5.2 Derivation 2

$$\mathbb{I}(\Psi_\lambda) = e^{\Psi_\lambda} \tag{3910}$$

$$\int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \int e^{\Psi_\lambda} d\Psi_\lambda \tag{3911}$$

$$\int e^{\Psi_\lambda} d\Psi_\lambda = \chi + e^{\Psi_\lambda} \tag{3912}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda) d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{3913}$$

2.5.3 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{3914}$$

$$\int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r} \tag{3915}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r}) \tag{3916}$$

2.5.4 Derivation 4

$$\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \sin\left(P_e\right) \tag{3917}$$

$$\frac{d}{dP_e} \sin\left(P_e\right) = \cos\left(P_e\right) \tag{3918}$$

$$\frac{\frac{d}{dP_e} \sin\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{3919}$$

$$-1 + \frac{\frac{d}{dP_e} \sin\left(P_e\right)}{P_e} = -1 + \frac{\cos\left(P_e\right)}{P_e} \tag{3920}$$

2.5.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{3921}$$

$$\frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{3922}$$

$$F_c \cos\left(\mathbf{p}\right) = F_c \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) \tag{3923}$$

$$\int F_c \cos\left(\mathbf{p}\right) dF_c = \int F_c \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) dF_c \tag{3924}$$

2.5.6 Derivation 8

$$\mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{3925}$$

$$\frac{\partial}{\partial \varphi} \mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) = 1 \tag{3926}$$

$$\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) = 0 \tag{3927}$$

$$e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right)} = e^0 \tag{3928}$$

$$(e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right)})^{\sigma_x} = 1 \tag{3929}$$

2.5.7 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) \tag{3930}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) - 1 = -3\hat{p}_0(\phi, \mathbf{H}) - 1 \tag{3931}$$

$$-3\hat{p}_0(\phi, \mathbf{H}) - 1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) + \frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi) - 1 \tag{3932}$$

2.5.8 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log(\mathbf{g}) \tag{3933}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log(\mathbf{g}) \tag{3934}$$

$$\frac{d}{d\mathbf{g}}\log(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{3935}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\log(\mathbf{g})\right) = \cos\left(\frac{1}{\mathbf{g}}\right) \tag{3936}$$

2.5.9 Derivation 16

$$f(C_d) = C_d \tag{3937}$$

$$\frac{d}{df(C_d)}f(C_d) = \frac{d}{dC_d}C_d \tag{3938}$$

$$\frac{d}{dC_d}C_d = 1 \tag{3939}$$

$$\frac{1}{\frac{d}{df(C_d)}f(C_d)} = \frac{1}{1} \tag{3940}$$

$$1 = \frac{1}{\frac{d}{df(C_d)}f(C_d)} \tag{3941}$$

2.5.10 Derivation 17

$$\hat{X}(f') = \cos(f') \tag{3942}$$

$$\frac{d}{d(f')}\hat{X}(f') = -\sin(f') \tag{3943}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos(f') \tag{3944}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}(f')} = -\frac{\cos(f')}{\mathrm{P_e}(f')} \tag{3945}$$

2.5.11 Derivation 18

$$W(P_e) = \log(P_e) \tag{3946}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log(P_e) \tag{3947}$$

$$\frac{d}{dP_e}\log(P_e) = \frac{1}{P_e} \tag{3948}$$

$$\int \frac{d}{dP_e}\log(P_e)dP_e = \int \frac{1}{P_e}dP_e \tag{3949}$$

2.5.12 Derivation 19

$$\mathrm{E}_\lambda(\hat{H}_l) = \int e^{\hat{H}_l}d\hat{H}_l \tag{3950}$$

$$A_y = \mathrm{E}_\lambda(\hat{H}_l) - e^{\hat{H}_l} \tag{3951}$$

$$A_y + e^{\hat{H}_l} = \mathrm{E}_\lambda(\hat{H}_l) \tag{3952}$$

$$(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 = 0 \tag{3953}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 \tag{3954}$$

2.5.13 Derivation 21

$$\mathrm{E_n}(S) = \int e^S dS \tag{3955}$$

$$\frac{T^2}{2} + Te^S = \frac{T^2}{2} + T\,\mathrm{E_n}(S) \tag{3956}$$

$$\psi^* = t_2 \tag{3957}$$

$$\frac{T^2}{2} + Te^S + \psi^* = \frac{T^2}{2} + Te^S + t_2 \tag{3958}$$

2.5.14 Derivation 23

$$\mathbf{p}(\phi) = \cos(e^\phi) \tag{3959}$$

$$\frac{d}{d\phi}\mathbf{p}(\phi) = -e^\phi \sin(e^\phi) \tag{3960}$$

$$\iint \mathbf{p}(\phi)d\phi d\phi = \int (\omega + \mathrm{Ci}(e^\phi))d\phi \tag{3961}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi)d\phi d\phi = \frac{\partial}{\partial\phi}\int (\omega + \mathrm{Ci}(e^\phi))d\phi \tag{3962}$$

2.5.15 Derivation 25

$$\theta_1(g) = e^g \tag{3963}$$

$$\mathbf{g} + \theta_1(g) = \mathbf{g} + e^g \tag{3964}$$

$$(\mathbf{g} + \theta_1(g))^g = (\mathbf{g} + e^g)^g \tag{3965}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g = \frac{d}{dg}(\mathbf{g} + e^g)^g \tag{3966}$$

$$\int e^g dg = \int \theta_1(g) dg \tag{3967}$$

$$(\int e^g dg)^g = (\int \theta_1(g) dg)^g \tag{3968}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g = \frac{d}{dg}(\int e^g dg)^g \tag{3969}$$

2.5.16 Derivation 27

$$\phi(x') = \int \log(x') dx' \tag{3970}$$

$$\mathrm{t}_1(x', n_2) = \frac{\partial}{\partial x'}(n_2 + x' \log(x') - x') \tag{3971}$$

$$\frac{d}{dx'}\phi(x') = \log(x') \tag{3972}$$

$$e^{-\frac{d}{dx'}\phi(x')} = e^{-\log(x')} \tag{3973}$$

$$e^{-\log(x')} = \frac{1}{x'} \tag{3974}$$

$$\mathrm{t}_1(x', n_2) e^{-\frac{d}{dx'}\phi(x')} = \frac{\partial}{\partial x'}(n_2 + x' \log(x') - x') \frac{1}{x'} \tag{3975}$$

$$\mathrm{t}_1(x', n_2) e^{-\frac{d}{dx'}\phi(x')} = e^{-\frac{d}{dx'}\phi(x')} \frac{d}{dx'}\phi(x') \tag{3976}$$

2.5.17 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{3977}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{3978}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{3979}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\varepsilon}{v_1} \tag{3980}$$

2.5.18 Derivation 35

$$\lambda(V) = V \tag{3981}$$

$$\frac{d}{d\lambda(V)}\lambda(V) = \frac{d}{dV}V \tag{3982}$$

$$\frac{d}{dV}V = 1 \tag{3983}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} = \frac{1}{V} \tag{3984}$$

$$\frac{1}{\lambda(V)} = \frac{1}{V} \tag{3985}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} = \frac{1}{V} - \frac{1}{V} \tag{3986}$$

$$\frac{\frac{d}{d\lambda(V)}\lambda(V)}{\lambda(V)} - \frac{1}{\lambda(V)} = 0 \tag{3987}$$

2.5.19 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = A + V - \dot{z} \tag{3988}$$

$$\int (A + V - \dot{z}) dV = \int (A + V - \dot{z}) dV \tag{3989}$$

$$\int (A + V - \dot{z}) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{3990}$$

2.5.20 Derivation 37

$$\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} \tag{3991}$$

$$\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}} = e^{\mathbf{S}} + e^{\mathbf{S}} \tag{3992}$$

$$\frac{d}{d\mathbf{S}}(\mathrm{A_x}(\mathbf{S}) + e^{\mathbf{S}}) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + e^{\mathbf{S}}) \tag{3993}$$

$$\frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) = \frac{d}{d\mathbf{S}}e^{\mathbf{S}} \tag{3994}$$

$$e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S}) = e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}e^{\mathbf{S}} \tag{3995}$$

$$\frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + \frac{d}{d\mathbf{S}}\mathrm{A_x}(\mathbf{S})) = \frac{d}{d\mathbf{S}}(e^{\mathbf{S}} + e^{\mathbf{S}}) \tag{3996}$$

2.5.21 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{3997}$$

$$\int (\mathbf{A} + \varepsilon_0) d\mathbf{A} = \int \mathbf{A} d\mathbf{A} + \int \varepsilon_0 d\mathbf{A} \tag{3998}$$

$$\int \mathbf{A} d\mathbf{A} = \frac{\mathbf{A}^2}{2} \tag{3999}$$

$$\int \varepsilon_0 d\mathbf{A} = \varepsilon_0 \mathbf{A} + x \tag{4000}$$

$$\frac{\mathbf{A}^2}{2} + \varepsilon_0 \mathbf{A} + x = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \tag{4001}$$

$$(\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{4002}$$

2.5.22 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{4003}$$

$$F_g = \mathrm{F_x}(\pi) \tag{4004}$$

$$P_g = \mathrm{F_x}(\pi) \tag{4005}$$

$$F_g - P_g = 0 \tag{4006}$$

$$0 = F_g - P_g \tag{4007}$$

2.5.23 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{4008}$$

$$\int u(\lambda) d\lambda = \int \sin(\lambda) d\lambda \tag{4009}$$

$$-\frac{\int \sin(\lambda) d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{4010}$$

2.5.24 Derivation 49

$$\hat{x}(f) = \int \log(f) df \tag{4011}$$

$$B + f\log(f) = B + \hat{x}(f) \tag{4012}$$

$$B + f\log(f) = f + \int \log(f) df \tag{4013}$$

2.5.25 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{4014}$$

$$\mathbf{p} = \frac{C_2^2}{2} \tag{4015}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{4016}$$

2.5.26 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{4017}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{4018}$$

$$a(\mathbf{s}) = \log(\mathbf{s}) - \int \log(\mathbf{s}) d\mathbf{s} \tag{4019}$$

$$\int \log(\mathbf{s}) d\mathbf{s} = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega \tag{4020}$$

$$a(\mathbf{s}) = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{4021}$$

2.5.27 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{4022}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \frac{d}{dA}e^A \tag{4023}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = e^A \tag{4024}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = e^{A^2} \tag{4025}$$

$$\mathrm{A_y}^A(A) = e^{A^2} \tag{4026}$$

$$(\frac{d}{dA}\mathrm{A_y}(A))^A = \mathrm{A_y}^A(A) \tag{4027}$$

2.5.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{4028}$$

$$\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}} \tag{4029}$$

$$\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}} = -\frac{r_0}{\mathbf{P}^2} \tag{4030}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} = \frac{-\frac{r_0}{\mathbf{P}^2}}{\mathbf{P}} \tag{4031}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{4032}$$

2.5.29 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{4033}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{4034}$$

2.5.30 Derivation 57

$$\phi(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{4035}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = \frac{C_2 f_{\mathbf{p}}}{y} \tag{4036}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{\partial}{\partial C_2}\frac{C_2 f_{\mathbf{p}}}{y} \tag{4037}$$

$$\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) = \frac{f_{\mathbf{p}}}{y} \tag{4038}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = C_2\frac{\partial}{\partial C_2}\phi(C_2, y, f_{\mathbf{p}}) \tag{4039}$$

$$\hat{x}_0(C_2, y, f_{\mathbf{p}}) = C_2\frac{f_{\mathbf{p}}}{y} \tag{4040}$$

2.5.31 Derivation 58

$$\mathrm{E_x}(t_2) = \frac{1}{t_2} \tag{4041}$$

$$\int \mathrm{E_x}(t_2)dt_2 = \int \frac{1}{t_2}dt_2 \tag{4042}$$

$$\int \mathrm{E_x}(t_2)dt_2 = C_1 + \log(t_2) \tag{4043}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \mathrm{E_x}(t_2)dt_2)^{t_2} \tag{4044}$$

2.5.32 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{4045}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*}\log(\psi^*) \tag{4046}$$

$$\frac{d}{d\psi^*}\log(\psi^*) = \frac{1}{\psi^*} \tag{4047}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*} \tag{4048}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} \tag{4049}$$

2.5.33 Derivation 60

$$H(u) = e^u \tag{4050}$$

$$\frac{e^u}{H(u)} = \frac{e^u}{e^u} \tag{4051}$$

$$\frac{e^u}{H(u)} = 1 \tag{4052}$$

$$\int \frac{e^u}{H(u)}du = \int 1du \tag{4053}$$

$$\int \frac{e^u}{H(u)}du = u + A_x \tag{4054}$$

$$-\int \frac{e^u}{H(u)}du = -(u + A_x) \tag{4055}$$

$$-A_x - u = -\int \frac{e^u}{H(u)}du \tag{4056}$$

2.5.34 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{4057}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{4058}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{4059}$$

2.5.35 Derivation 64

$$\delta(q) = \log(q) \tag{4060}$$

$$q\delta(q) = q\log(q) \tag{4061}$$

$$A_2 - m_s + q\delta(q) - q\log(q) = A_2 - m_s \tag{4062}$$

$$\frac{d}{dA_2}0 = \frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log(q)) \tag{4063}$$

2.5.36 Derivation 65

$$\mathrm{A_y}(\phi_2) = \cos(\phi_2) \tag{4064}$$

$$\frac{d}{d\phi_2}\cos(\phi_2) = -\sin(\phi_2) \tag{4065}$$

$$\frac{d^2}{d\phi_2^2}\cos(\phi_2) = -\cos(\phi_2) \tag{4066}$$

$$\frac{d^3}{d\phi_2^3}\cos(\phi_2) = \sin(\phi_2) \tag{4067}$$

$$\frac{d^3}{d\phi_2^3}\cos(\phi_2) = \frac{d^2}{d\phi_2^2} - \sin(\phi_2) \tag{4068}$$

2.5.37 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{4069}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} = \frac{d}{d\varphi^*}l(\varphi^*) \tag{4070}$$

$$l(\varphi^*) - 1 = \frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 \tag{4071}$$

2.5.38 Derivation 70

$$\hat{\mathbf{r}}(U) = \cos(U) \tag{4072}$$

$$\frac{1}{2}\sin(2U) = \frac{\sin(U)\cos(U)}{2} \tag{4073}$$

$$\int \cos^2(U)dU = \frac{U}{2} + y + \frac{1}{2}\sin(2U) \tag{4074}$$

$$\frac{U}{2} + y + \frac{\sin(U)\cos(U)}{2} = \int \cos^2(U)dU \tag{4075}$$

2.5.39 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{4076}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{4077}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = 1 \tag{4078}$$

$$(\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G = 1^G \tag{4079}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = 1 \tag{4080}$$

2.5.40 Derivation 72

$$\mathrm{A_1}(\theta_1) = \cos(\theta_1) \tag{4081}$$

$$\int \cos^2(\theta_1)d\theta_1 = \int \frac{1 + \cos(2\theta_1)}{2}d\theta_1 \tag{4082}$$

$$\int \cos^2(\theta_1)d\theta_1 = \frac{\theta_1}{2} + \frac{\sin(2\theta_1)}{4} + C \tag{4083}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} = \frac{\theta_1}{2} + t_2 + \frac{\sin(2\theta_1)}{4} \tag{4084}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} = \int \cos^2(\theta_1)d\theta_1 \tag{4085}$$

2.5.41 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{4086}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}(s(\mathbf{J}_P + \rho_b)) \tag{4087}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = (\mathbf{J}_P + \rho_b) \tag{4088}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{(\mathbf{J}_P + \rho_b)}{\mathbf{J}_P} \tag{4089}$$

2.5.42 Derivation 75

$$\mathrm{A_z}(F_N) = \sin(F_N) \tag{4090}$$

$$\mathbf{v}(F_N) = (\int \mathrm{A_z}(F_N)dF_N)^2 \tag{4091}$$

$$\mathbf{v}(F_N) = (\int \sin(F_N)dF_N)^2 \tag{4092}$$

$$(\int \sin(F_N)dF_N)^2 = (Q - \cos(F_N))^2 \tag{4093}$$

2.5.43 Derivation 76

$$r(\hat{X}) = \sin(\hat{X}) \tag{4094}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos(\hat{X}) \tag{4095}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin(\hat{X}) \tag{4096}$$

2.5.44 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{4097}$$

$$\sin(L_\varepsilon) = \sqrt{1 - \cos^2(L_\varepsilon)} \tag{4098}$$

$$r_0 = \pi \tag{4099}$$

$$(r_0 + \sin(L_\varepsilon) + 1)^\pi = (\pi + \sin(L_\varepsilon) + 1)^\pi \tag{4100}$$

2.5.45 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin{(\hat{H}_l)} d\hat{H}_l \tag{4101}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos{(\hat{H}_l)} \tag{4102}$$

$$(-\mathbf{F}(\hat{H}_l)) = -V + \cos{(\hat{H}_l)} \tag{4103}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos{(\hat{H}_l)})^C \tag{4104}$$

2.5.46 Derivation 82

$$\mathrm{f}'\left(\mathbf{J}_f\right) = \frac{d}{d\mathbf{J}_f} \sin{(\mathbf{J}_f)} \tag{4105}$$

$$\mathrm{f}'\left(\mathbf{J}_f\right) = \cos{(\mathbf{J}_f)} \tag{4106}$$

$$\mathrm{f}'\left(\mathbf{J}_f\right) \sin{(\mathbf{J}_f)} = \cos{(\mathbf{J}_f)} \sin{(\mathbf{J}_f)} \tag{4107}$$

$$\sin{(\mathbf{J}_f)} \cos{(\mathbf{J}_f)} = \sin{(\mathbf{J}_f)} \cos{(\mathbf{J}_f)} \tag{4108}$$

2.5.47 Derivation 90

$$\omega(\mu) = e^{\mu} \tag{4109}$$

$$\frac{e^{\mu}}{\omega(\mu)} = \frac{e^{\mu}}{e^{\mu}} \tag{4110}$$

$$\frac{e^{\mu}}{\omega(\mu)} = 1 \tag{4111}$$

$$\frac{1}{\omega(\mu)} = \frac{1}{e^{\mu}} \tag{4112}$$

$$\mathbf{J} + \mu + \frac{e^{\mu}}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + 1 - \frac{1}{e^{\mu}} \tag{4113}$$

$$\int \frac{e^{\mu}}{\omega(\mu)} d\mu = \int 1 d\mu \tag{4114}$$

$$\int \frac{e^{\mu}}{\omega(\mu)} d\mu = \mu + C \tag{4115}$$

$$\int \frac{e^{\mu}}{\omega(\mu)} d\mu + \frac{e^{\mu}}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mu + C + 1 - \frac{1}{e^{\mu}} \tag{4116}$$

2.5.48 Derivation 91

$$\mathrm{v_t}\left(q\right) = \int \cos{(q)} dq \tag{4117}$$

$$\mathrm{y}'\left(q, E\right) = -E - \sin{(q)} + \frac{E + \sin{(q)}}{E} \tag{4118}$$

$$\mathrm{y}'\left(q, E\right) = -E - \sin{(q)} + \frac{\int \cos{(q)} dq}{E} \tag{4119}$$

2.5.49 Derivation 92

$$\mathbf{J}(q) = \log{(q)} \tag{4120}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq} \log{(q)} \tag{4121}$$

$$\frac{d}{dq} \log{(q)} = \frac{1}{q} \tag{4122}$$

$$\iint \mathbf{v} \frac{d}{dq} \log{(q)} dq dq = \iint \mathbf{v} \frac{1}{q} dq dq \tag{4123}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log{(q)} dq dq}{\log{(q)}} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log{(q)}} \tag{4124}$$

2.5.50 Derivation 97

$$\mathbf{J}_f(F_g) = e^{e^{F_g}} \tag{4125}$$

$$\int \mathbf{J}_f(F_g) dF_g = \int e^{e^{F_g}} dF_g \tag{4126}$$

$$2 \int \mathbf{J}_f(F_g) dF_g = 2 \int e^{e^{F_g}} dF_g \tag{4127}$$

$$z^* + \operatorname{Ei}{(e^{F_g})} + \int \mathbf{J}_f(F_g) dF_g = z^* + \operatorname{Ei}{(e^{F_g})} + \int e^{e^{F_g}} dF_g \tag{4128}$$

$$2 \int \mathbf{J}_f(F_g) dF_g = z^* + \operatorname{Ei}{(e^{F_g})} + \int \mathbf{J}_f(F_g) dF_g \tag{4129}$$

3 flan-t5-large output

3.1 Perturbation: static

3.1.1 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}} \sin\left(\mathbf{s}\right) \tag{4130}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d^2}{d\mathbf{s}^2} \sin\left(\mathbf{s}\right) \tag{4131}$$

$$\frac{d}{d\mathbf{s}} \mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{4132}$$

$$\frac{d^2}{d\mathbf{s}^2} \sin\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{4133}$$

3.1.2 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{4134}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 \tag{4135}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 (\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r}) \tag{4136}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r}) d\hat{x}_0 = \hat{x}_0 (\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0 \mathbf{r}) \tag{4137}$$

3.1.3 Derivation 4

$$\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \sin\left(P_e\right) \tag{4138}$$

$$\frac{d}{dP_e} \mathrm{V}_{\mathbf{B}}\left(P_e\right) = \frac{d}{dP_e} \sin\left(P_e\right) \tag{4139}$$

$$\frac{d}{dP_e} \mathrm{V}_{\mathbf{B}}\left(P_e\right) = \cos\left(P_e\right) \tag{4140}$$

$$\frac{\frac{d}{dP_e} \mathrm{V}_{\mathbf{B}}\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{4141}$$

$$\frac{\frac{d}{dP_e} \sin\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{4142}$$

$$-1 + \frac{\frac{d}{dP_e} \sin\left(P_e\right)}{P_e} = -1 + \frac{\cos\left(P_e\right)}{P_e} \tag{4143}$$

3.1.4 Derivation 6

$$\mathbf{M}(J) = \cos\left(J\right) \tag{4144}$$

$$\int \mathbf{M}(J) dJ = \int \cos\left(J\right) dJ \tag{4145}$$

$$(\int \mathbf{M}(J) dJ)^{F_g} = (\int \cos\left(J\right) dJ)^{F_g} \tag{4146}$$

$$\int \mathbf{M}(J) dJ = F_g + \sin\left(J\right) \tag{4147}$$

$$(F_g + \sin\left(J\right))^{F_g} = (\int \cos\left(J\right) dJ)^{F_g} \tag{4148}$$

$$2(F_g + \sin\left(J\right))^{F_g} = (F_g + \sin\left(J\right))^{F_g} + (\int \cos\left(J\right) dJ)^{F_g} \tag{4149}$$

$$\int 2(F_g + \sin\left(J\right))^{F_g} dF_g = \int ((F_g + \sin\left(J\right))^{F_g} + (\int \cos\left(J\right) dJ)^{F_g} \tag{4150}$$

3.1.5 Derivation 7

$$\mathrm{C}_{\mathrm{d}}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{4151}$$

$$\frac{d}{d\mathbf{p}} \mathrm{C}_{\mathrm{d}}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) \tag{4152}$$

$$\frac{d}{d\mathbf{p}} \mathrm{C}_{\mathrm{d}}\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{4153}$$

$$\cos\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) \tag{4154}$$

$$F_c \cos\left(\mathbf{p}\right) = F_c \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) \tag{4155}$$

$$\int F_c \cos\left(\mathbf{p}\right) dF_c = \int F_c \frac{d}{d\mathbf{p}} \sin\left(\mathbf{p}\right) dF_c \tag{4156}$$

3.1.6 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) \tag{4157}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{4158}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{d}{d\phi}1 \tag{4159}$$

$$0 = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) - 1 \tag{4160}$$

$$-\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = -\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi) \tag{4161}$$

$$0 = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{4162}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi)-1 \tag{4163}$$

3.1.7 Derivation 10

$$\theta(q) = \cos{(q)} \tag{4164}$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos{(q)} \tag{4165}$$

$$\frac{d}{dq}\theta(q) = -\sin{(q)} \tag{4166}$$

$$(\frac{d}{dq}\theta(q))^q = (-\sin{(q)})^q \tag{4167}$$

$$(\frac{d}{dq}\cos{(q)})^q = (-\sin{(q)})^q \tag{4168}$$

$$(-\sin{(q)})^q\frac{d}{dq}\theta(q) = (-\sin{(q)})^q(\frac{d}{dq}\cos{(q)})^q \tag{4169}$$

$$(-\sin{(q)})^{2q} = (-\sin{(q)})^q(\frac{d}{dq}\cos{(q)})^q \tag{4170}$$

3.1.8 Derivation 13

$$\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) = \frac{\partial}{\partial \mathbf{P}}Q\mathbf{P} \tag{4171}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) = \mathbf{P}\frac{\partial}{\partial \mathbf{P}}Q\mathbf{P} \tag{4172}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) = Q\mathbf{P} \tag{4173}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right)-\cos{(\sin{(J)})} = Q\mathbf{P}-\cos{(\sin{(J)})} \tag{4174}$$

$$\frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) - \cos{(\sin{(J)})}}{J} = \frac{Q\mathbf{P} - \cos{(\sin{(J)})}}{J} \tag{4175}$$

3.1.9 Derivation 14

$$\mathrm{a}^{\dagger}\left(u\right) = \cos{(u)} \tag{4176}$$

$$\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right) = \frac{d}{du}\cos{(u)} \tag{4177}$$

$$(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^u = (\frac{d}{du}\cos{(u)})^u \tag{4178}$$

$$(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^u = (-\sin{(u)})^u \tag{4179}$$

$$(\frac{d}{du}\cos{(u)})^u = (-\sin{(u)})^u \tag{4180}$$

$$\frac{d}{du}(\frac{d}{du}\cos{(u)})^u = \frac{d}{du}(-\sin{(u)})^u \tag{4181}$$

3.1.10 Derivation 16

$$f(C_d) = C_d \tag{4182}$$

$$\frac{d}{dC_d}f(C_d) = \frac{d}{dC_d}C_d \tag{4183}$$

$$\frac{d}{dC_d}f(C_d) = 1 \tag{4184}$$

$$\frac{d}{dC_d}C_d = 1 \tag{4185}$$

$$1 = \frac{1}{\frac{d}{dC_d}C_d} \tag{4186}$$

$$1 = \frac{1}{\frac{d}{df(C_d)}f(C_d)} \tag{4187}$$

3.1.11 Derivation 17

$$\hat{X}(f') = \cos{(f')} \tag{4188}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos{(f')} \tag{4189}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos{(f')} \tag{4190}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos{(f')} \tag{4191}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\,(f')} = -\frac{\cos{(f')}}{\mathrm{P_e}\,(f')} \tag{4192}$$

3.1.12 Derivation 19

$$\mathrm{E}_\lambda\,(\hat{H}_l) = \int e^{\hat{H}_l} d\hat{H}_l \tag{4193}$$

$$0 = -\,\mathrm{E}_\lambda\,(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l \tag{4194}$$

$$0 = (-\,\mathrm{E}_\lambda\,(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{4195}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\,(\hat{H}_l) + e^{\hat{H}_l})^2 \tag{4196}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{4197}$$

3.1.13 Derivation 20

$$\mathrm{n}_2\,(V_\mathbf{B}, \mu_0) = \cos{(V_\mathbf{B} + \mu_0)} \tag{4198}$$

$$\int \mathrm{n}_2\,(V_\mathbf{B}, \mu_0) d\mu_0 = \int \cos{(V_\mathbf{B} + \mu_0)} d\mu_0 \tag{4199}$$

$$\int \mathrm{n}_2\,(V_\mathbf{B}, \mu_0) d\mu_0 = C_2 + \sin{(V_\mathbf{B} + \mu_0)} \tag{4200}$$

$$\int \cos{(V_\mathbf{B} + \mu_0)} d\mu_0 = C_2 + \sin{(V_\mathbf{B} + \mu_0)} \tag{4201}$$

3.1.14 Derivation 23

$$\mathbf{p}(\phi) = \cos{(e^\phi)} \tag{4202}$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos{(e^\phi)} d\phi \tag{4203}$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}\,(e^\phi) \tag{4204}$$

$$\iint \mathbf{p}(\phi) d\phi d\phi = \int (\omega + \mathrm{Ci}\,(e^\phi)) d\phi \tag{4205}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi) d\phi d\phi = \frac{\partial}{\partial\phi}\int (\omega + \mathrm{Ci}\,(e^\phi)) d\phi \tag{4206}$$

3.1.15 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{4207}$$

$$\int y(A_x) dA_x = \int \frac{1}{A_x} dA_x \tag{4208}$$

$$\int y(A_x) dA_x = \varepsilon_0 + \log{(A_x)} \tag{4209}$$

$$\int \frac{1}{A_x} dA_x = \varepsilon_0 + \log{(A_x)} \tag{4210}$$

$$\int \frac{1}{A_x} dA_x - \frac{x}{A_x} = \varepsilon_0 + \log{(A_x)} - \frac{x}{A_x} \tag{4211}$$

$$\frac{\partial}{\partial x}(\int \frac{1}{A_x} dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\varepsilon_0 + \log{(A_x)} - \frac{x}{A_x}) \tag{4212}$$

3.1.16 Derivation 25

$$\theta_1(g) = e^g \tag{4213}$$

$$\int \theta_1(g) dg = \int e^g dg \tag{4214}$$

$$(\int \theta_1(g) dg)^g = (\int e^g dg)^g \tag{4215}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^g = \frac{d}{dg}(\int e^g dg)^g \tag{4216}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \tag{4217}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g = \frac{d}{dg}(\int e^g dg)^g \tag{4218}$$

3.1.17 Derivation 29

$$q(c_0) = e^{c_0} \tag{4219}$$

$$\int q(c_0)dc_0 = \int e^{c_0}dc_0 \tag{4220}$$

$$e^{-c_0}\int q(c_0)dc_0 = e^{-c_0}\int e^{c_0}dc_0 \tag{4221}$$

$$e^{-c_0}\int q(c_0)dc_0 = (n + e^{c_0})e^{-c_0} \tag{4222}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{(n + e^{c_0})e^{-c_0}}{q(c_0)} \tag{4223}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + q(c_0)}{q(c_0)} \tag{4224}$$

3.1.18 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{4225}$$

$$b(A_x, i) - \frac{\partial}{\partial A_x}(-A_x + i) = 0 \tag{4226}$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \tag{4227}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{4228}$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i}di = \int 0di \tag{4229}$$

3.1.19 Derivation 32

$$\mathrm{P_e}\,(\dot{z}) = \sin\,(\dot{z}) \tag{4230}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \frac{d}{d\dot{z}}\sin\,(\dot{z}) \tag{4231}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \cos\,(\dot{z}) \tag{4232}$$

$$\mathrm{P_e}\,(\dot{z})\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \mathrm{P_e}\,(\dot{z})\cos\,(\dot{z}) \tag{4233}$$

3.1.20 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{4234}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{4235}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{4236}$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\varepsilon}{v_1} \tag{4237}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \tag{4238}$$

3.1.21 Derivation 36

$$\mathrm{f}'\,(\dot{z}, V, A) = A + V - \dot{z} \tag{4239}$$

$$\int \mathrm{f}'\,(\dot{z}, V, A)dV = \int (A + V - \dot{z})dV \tag{4240}$$

$$\int \mathrm{f}'\,(\dot{z}, V, A)dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{4241}$$

$$\int (A + V - \dot{z})dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{4242}$$

3.1.22 Derivation 39

$$(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{4243}$$

$$\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0)d\mathbf{A} \tag{4244}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{4245}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{4246}$$

$$(\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{4247}$$

3.1.23 Derivation 40

$$\hat{p}(k, \hat{H}_\lambda) = \frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} \tag{4248}$$

$$\hat{p}(k, \hat{H}_\lambda) = \frac{1}{k} \tag{4249}$$

$$\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = \frac{1}{k} \tag{4250}$$

$$-\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} + \frac{1}{k} = 0 \tag{4251}$$

3.1.24 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^\pi} \tag{4252}$$

$$\int \mathrm{F_x}(\pi) d\pi = \int e^{e^\pi} d\pi \tag{4253}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^\pi) \tag{4254}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^\pi) \tag{4255}$$

$$0 = F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi) d\pi \tag{4256}$$

$$0 = F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi) d\pi \tag{4257}$$

$$0 = F_g - P_g \tag{4258}$$

3.1.25 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{4259}$$

$$\int G(\nabla) d\nabla = \int \cos(\nabla) d\nabla \tag{4260}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{4261}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{4262}$$

$$\int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla = \int (\varphi + \sin(\nabla) + \cos(\nabla)) d\nabla \tag{4263}$$

$$-G(\nabla) + \int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla - \int \cos(\nabla) d\nabla = -G(\nabla) + \int (\varphi + \sin(\nabla) + \cos(\nabla)) d\nabla - \int \cos(\nabla) d\nabla \tag{4264}$$

3.1.26 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{4265}$$

$$f^* \nabla(f^*, \pi) = f^* \frac{\partial}{\partial f^*}(\pi + f^*) \tag{4266}$$

$$f^* \nabla(f^*, \pi) = f^* \tag{4267}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) = f^* \tag{4268}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) = f^* \tag{4269}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) + \left(f^* \frac{\partial}{\partial f^*}(\pi + f^*)\right)^{f^*} = f^* \frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} \tag{4270}$$

3.1.27 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{4271}$$

$$\frac{\partial}{\partial \mathbf{r}} \eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} \tag{4272}$$

$$\frac{\partial}{\partial \mathbf{r}} \eta'(\mathbf{r}, F_x) = -\frac{F_x}{\mathbf{r}^2} \tag{4273}$$

$$\frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}^2} \tag{4274}$$

$$-F_x + \frac{\partial}{\partial \mathbf{r}} \frac{F_x}{\mathbf{r}} = -F_x - \frac{F_x}{\mathbf{r}^2} \tag{4275}$$

3.1.28 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{4276}$$

$$\int u(\lambda) d\lambda = \int \sin(\lambda) d\lambda \tag{4277}$$

$$\int u(\lambda) d\lambda = n - \cos(\lambda) \tag{4278}$$

$$-\frac{\int u(\lambda) d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{4279}$$

$$-\frac{\int \sin(\lambda) d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{4280}$$

3.1.29 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{4281}$$

$$\phi_1 \, \mathrm{f}'(\phi_1) = \phi_1^2 \tag{4282}$$

$$\int \phi_1 \, \mathrm{f}'(\phi_1) d\phi_1 = \int \phi_1^2 d\phi_1 \tag{4283}$$

$$\int \phi_1 \, \mathrm{f}'(\phi_1) d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{4284}$$

$$\int \phi_1^2 d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{4285}$$

$$\frac{\phi_1^3}{3} + n_2 = \hbar + \frac{\phi_1^3}{3} \tag{4286}$$

3.1.30 Derivation 48

$$\mathrm{a}^{\dagger}(\omega) = \int \log(\omega) d\omega \tag{4287}$$

$$\mathrm{a}^{\dagger}(\omega) = \omega \log(\omega) - \omega + \rho \tag{4288}$$

$$-\rho + \mathrm{a}^{\dagger}(\omega) = \omega \log(\omega) - \omega \tag{4289}$$

$$(-\rho + \mathrm{a}^{\dagger}(\omega))^{\omega} = (\omega \log(\omega) - \omega)^{\omega} \tag{4290}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^{\dagger}(\omega))^{\omega} = \frac{d}{d\rho}(\omega \log(\omega) - \omega)^{\omega} \tag{4291}$$

3.1.31 Derivation 49

$$\hat{x}(f) = \int \log(f) df \tag{4292}$$

$$\hat{x}(f) - \int \log(f) df = 0 \tag{4293}$$

$$\hat{x}(f) = B + f \log(f) - f \tag{4294}$$

$$B + f \log(f) = f + \int \log(f) df \tag{4295}$$

3.1.32 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{4296}$$

$$\int \mathbf{v}(C_2) dC_2 = \int C_2 dC_2 \tag{4297}$$

$$\int \mathbf{v}(C_2) dC_2 = \frac{C_2^2}{2} + v \tag{4298}$$

$$\int C_2 dC_2 = \frac{C_2^2}{2} + v \tag{4299}$$

$$\mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} = \int C_2 dC_2 \tag{4300}$$

$$\frac{C_2^2}{2} + \mathbf{p} = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{4301}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{4302}$$

3.1.33 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{4303}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{4304}$$

$$\frac{\partial}{\partial \mathbf{P}} \frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}^2} \tag{4305}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2 r_0}{\mathbf{P}^3} \tag{4306}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2 r_0}{\mathbf{P}^3} \tag{4307}$$

3.1.34 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{4308}$$

$$\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*} \log(\psi^*) \tag{4309}$$

$$\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*) = \frac{1}{\psi^*} \tag{4310}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*} \tag{4311}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*})^{\psi^*} \tag{4312}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} \tag{4313}$$

3.1.35 Derivation 64

$$\delta(q) = \log{(q)} \tag{4314}$$

$$\int \delta(q) dq = \int \log{(q)} dq \tag{4315}$$

$$0 = -\int \delta(q) dq + \int \log{(q)} dq \tag{4316}$$

$$0 = A_2 + q\log{(q)} - q - \int \delta(q) dq \tag{4317}$$

$$0 = A_2 + q\delta(q) - q\log{(q)} \tag{4318}$$

$$0 = A_2 - m_s + q\delta(q) - q\log{(q)} \tag{4319}$$

$$\frac{d}{dA_2} 0 = \frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log{(q)}) \tag{4320}$$

3.1.36 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{4321}$$

$$\frac{\partial}{\partial G} \mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{4322}$$

$$\frac{\partial}{\partial G} \mathrm{v_x}(G, L) = 1 \tag{4323}$$

$$(\frac{\partial}{\partial G} \mathrm{v_x}(G, L))^G = 1 \tag{4324}$$

$$((\frac{\partial}{\partial G} \mathrm{v_x}(G, L))^G)^G = 1 \tag{4325}$$

3.1.37 Derivation 72

$$\mathrm{A_1}(\theta_1) = \cos{(\theta_1)} \tag{4326}$$

$$\mathrm{A_1}(\theta_1)\cos{(\theta_1)} = \cos^2{(\theta_1)} \tag{4327}$$

$$\int \mathrm{A_1}(\theta_1)\cos{(\theta_1)} d\theta_1 = \int \cos^2{(\theta_1)} d\theta_1 \tag{4328}$$

$$\int \mathrm{A_1}(\theta_1)\cos{(\theta_1)} d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} \tag{4329}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} = \int \cos^2{(\theta_1)} d\theta_1 \tag{4330}$$

3.1.38 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{4331}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{4332}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{4333}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} \tag{4334}$$

3.1.39 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{4335}$$

$$\frac{d}{d\hat{X}} r(\hat{X}) = \frac{d}{d\hat{X}} \sin{(\hat{X})} \tag{4336}$$

$$\frac{d}{d\hat{X}} r(\hat{X}) = \cos{(\hat{X})} \tag{4337}$$

$$\frac{d}{d\hat{X}} \sin{(\hat{X})} = \cos{(\hat{X})} \tag{4338}$$

$$\frac{d^2}{d\hat{X}^2} \sin{(\hat{X})} = \frac{d}{d\hat{X}} \cos{(\hat{X})} \tag{4339}$$

$$\frac{d^2}{d\hat{X}^2} r(\hat{X}) = -\sin{(\hat{X})} \tag{4340}$$

3.1.40 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{4341}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon = \int \cos{(L_\varepsilon)} dL_\varepsilon \tag{4342}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \int \cos{(L_\varepsilon)} dL_\varepsilon + 1 \tag{4343}$$

$$\int \dot{z}(L_\varepsilon) dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{4344}$$

$$\int \cos{(L_\varepsilon)} dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{4345}$$

$$(\int \cos{(L_\varepsilon)} dL_\varepsilon + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{4346}$$

$$(r_0 + \sin{(L_\varepsilon)} + 1)^\pi = (\pi + \sin{(L_\varepsilon)} + 1)^\pi \tag{4347}$$

3.1.41 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{4348}$$

$$0 = -\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0) \tag{4349}$$

$$\frac{d}{d\varepsilon_0}0 = \frac{d}{d\varepsilon_0}(-\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0)) \tag{4350}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{4351}$$

$$\int 0 d\varepsilon_0 = \int(\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0))d\varepsilon_0 \tag{4352}$$

3.1.42 Derivation 80

$$S(Q, \mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{4353}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{4354}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{4355}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{4356}$$

$$\int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{4357}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{4358}$$

$$0 = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} \tag{4359}$$

3.1.43 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l)d\hat{H}_l \tag{4360}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{4361}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{4362}$$

$$-\int \sin(\hat{H}_l)d\hat{H}_l = -C + \cos(\hat{H}_l) \tag{4363}$$

$$(-\int \sin(\hat{H}_l)d\hat{H}_l)^C = (-C + \cos(\hat{H}_l))^C \tag{4364}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos(\hat{H}_l))^C \tag{4365}$$

3.1.44 Derivation 83

$$y(W, q, B) = W + \frac{q}{B} \tag{4366}$$

$$0 = W + \frac{q}{B} - y(W, q, B) \tag{4367}$$

$$\frac{d}{dq}0 = \frac{\partial}{\partial q}(W + \frac{q}{B} - y(W, q, B)) \tag{4368}$$

$$0 = -\frac{\partial}{\partial q}y(W, q, B) + \frac{1}{B} \tag{4369}$$

$$0 = -\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} \tag{4370}$$

3.1.45 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{4371}$$

$$\mathbf{S}^Z(Z) = (\int e^Z dZ)^Z \tag{4372}$$

$$\mathbf{S}(Z)(\hat{H}_\lambda + e^Z) = (\hat{H}_\lambda + e^Z)^Z \tag{4373}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\int e^Z dZ)^Z \tag{4374}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{4375}$$

$$((\phi + e^Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{4376}$$

$$e^{((\phi+e^Z)e^Z)^\phi} = e^{(e^Z \int e^Z dZ)^\phi} \tag{4377}$$

3.1.46 Derivation 85

$$\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{4378}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \frac{d}{d\varepsilon}e^\varepsilon \tag{4379}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{4380}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + e^\varepsilon \tag{4381}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) \tag{4382}$$

3.1.47 Derivation 87

$$\mathrm{r}_0\left(\eta, g\right) = \int (\eta + g) dg \tag{4383}$$

$$\mathrm{r}_0\left(\eta, g\right) = \eta g + \sigma_p + \frac{g^2}{2} \tag{4384}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg = 2\eta g + 2\sigma_p + g^2 \tag{4385}$$

3.1.48 Derivation 93

$$\mathbf{M}(C_2, \hat{p}) = \int (-C_2 + \hat{p}) dC_2 \tag{4386}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (\int (-C_2 + \hat{p}) dC_2)^{C_2} \tag{4387}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} \tag{4388}$$

$$(\int (-C_2 + \hat{p}) dC_2)^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{4389}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^{\dagger})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{4390}$$

$$\mathbf{M}^{C_2}(C_2, \hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{4391}$$

3.1.49 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{4392}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{4393}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{4394}$$

$$\frac{\partial}{\partial h}\frac{h}{\mathbf{s}} = \frac{1}{\mathbf{s}} \tag{4395}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h} - 1} \tag{4396}$$

3.1.50 Derivation 98

$$\Psi(\delta) = \log\left(\delta\right) \tag{4397}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log\left(\delta\right) \tag{4398}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{4399}$$

$$(\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log\left(\delta\right) = \frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} \tag{4400}$$

3.2 Perturbation: VR

3.2.1 Derivation 1

$$\beta(\gamma) = \frac{d}{d\gamma}\sin\left(\gamma\right) \tag{4401}$$

$$\frac{d}{d\gamma}\beta(\gamma) = \frac{d^2}{d\gamma^2}\sin\left(\gamma\right) \tag{4402}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin\left(\gamma\right) \tag{4403}$$

$$\frac{d^2}{d\gamma^2}\sin\left(\gamma\right) = -\sin\left(\gamma\right) \tag{4404}$$

3.2.2 Derivation 3

$$\gamma(\iota, \beta) = \int (-\beta + \iota) d\beta \tag{4405}$$

$$\frac{\partial}{\partial \iota}\gamma(\iota, \beta) = \frac{\partial}{\partial \iota}\int (-\beta + \iota) d\beta \tag{4406}$$

$$\frac{\partial}{\partial \iota}\gamma(\iota, \beta) = \frac{\partial}{\partial \iota}\int (-\beta + \iota) d\beta \tag{4407}$$

$$\frac{\partial^2}{\partial \iota}\gamma(\iota, \beta) = \frac{\partial^2}{\partial \iota}\int (-\beta + \iota) d\beta \tag{4408}$$

$$\beta\gamma(\iota, \beta) = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{4409}$$

$$\beta\int (-\beta + \iota) d\beta = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{4410}$$

3.2.3 Derivation 4

$$\beta(o) = \sin{(o)} \tag{4411}$$

$$\frac{d}{do}\beta(o) = \frac{d}{do}\sin{(o)} \tag{4412}$$

$$\frac{d}{do}\beta(o) = \cos{(o)} \tag{4413}$$

$$\frac{\frac{d}{do}\beta(o)}{o} = \frac{\cos{(o)}}{o} \tag{4414}$$

$$\frac{\frac{d}{do}\sin{(o)}}{o} = \frac{\cos{(o)}}{o} \tag{4415}$$

$$-1 + \frac{\frac{d}{do}\sin{(o)}}{o} = -1 + \frac{\cos{(o)}}{o} \tag{4416}$$

3.2.4 Derivation 6

$$o(\upsilon) = \cos{(\upsilon)} \tag{4417}$$

$$\int o(\upsilon)d\upsilon = \int \cos{(\upsilon)}d\upsilon \tag{4418}$$

$$(\int o(\upsilon)d\upsilon)^{\tau} = (\int \cos{(\upsilon)}d\upsilon)^{\tau} \tag{4419}$$

$$\int o(\upsilon)d\upsilon = \tau + \sin{(\upsilon)} \tag{4420}$$

$$(\tau + \sin{(\upsilon)})^{\tau} = (\int \cos{(\upsilon)}d\upsilon)^{\tau} \tag{4421}$$

$$2(\tau+\sin{(\upsilon)})^{\tau} = (\int \cos{(\upsilon)}d\upsilon)^{\tau}+(\int \cos{(\upsilon)}d\upsilon)^{\tau} \tag{4422}$$

$$\int 2(\tau+\sin{(\upsilon)})^{\tau}d\tau = \int((\tau+\sin{(\upsilon)})^{\tau}+(\int \cos{(\upsilon)}d\upsilon)^{\tau})d\tau \tag{4423}$$

3.2.5 Derivation 7

$$\tau(\nu) = \sin{(\nu)} \tag{4424}$$

$$\frac{d}{d\nu}\tau(\nu) = \frac{d}{d\nu}\sin{(\nu)} \tag{4425}$$

$$\frac{d}{d\nu}\tau(\nu) = \cos{(\nu)} \tag{4426}$$

$$\cos{(\nu)} = \frac{d}{d\nu}\sin{(\nu)} \tag{4427}$$

$$\alpha\cos{(\nu)} = \alpha\frac{d}{d\nu}\sin{(\mu)} \tag{4428}$$

$$\int \alpha\cos{(\nu)}d\alpha = \int \alpha\frac{d}{d\nu}\sin{(\mu)}d\alpha \tag{4429}$$

3.2.6 Derivation 9

$$\beta(\kappa, \tau) = \frac{\partial}{\partial\kappa}(\kappa - \tau) \tag{4430}$$

$$\beta(\kappa, \tau) = 1 \tag{4431}$$

$$\frac{\partial}{\partial\kappa}\beta(\kappa, \tau) = \frac{d}{d\kappa}1 \tag{4432}$$

$$0 = \frac{\partial}{\partial\kappa}\beta(\kappa, \tau) - 1 \tag{4433}$$

$$0 = \frac{\partial}{\partial\kappa}(\kappa - \tau) - 1 \tag{4434}$$

$$-\frac{\partial}{\partial\kappa}(\kappa-\tau)-1 = -\frac{\partial}{\partial\kappa}(\kappa-\tau)+\frac{\partial^2}{\partial\kappa^2}(\kappa-\tau)-1 \tag{4435}$$

3.2.7 Derivation 10

$$o(\xi) = \cos{(\xi)} \tag{4436}$$

$$\frac{d}{d\xi}o(\xi) = \frac{d}{d\xi}\cos{(\xi)} \tag{4437}$$

$$\frac{d}{d\xi}o(\xi) = -\sin{(\xi)} \tag{4438}$$

$$\frac{d}{d\xi}\cos{(\xi)} = -\sin{(\xi)} \tag{4439}$$

$$(\frac{d}{d\xi}\cos{(\xi)})^{\xi} = (-\sin{(\xi)})^{\xi} \tag{4440}$$

$$(-\sin{(\xi)})^{\xi} = (-\sin{(\xi)})^{\xi} \tag{4441}$$

$$(-\sin{(\xi)})^{2\xi} = (-\sin{(\xi)})^{\xi}(\frac{d}{d\xi}\cos{(\xi)})^{\xi} \tag{4442}$$

3.2.8 Derivation 13

$$\xi(\zeta,\nu) = \frac{\partial}{\partial\nu}\nu\zeta \tag{4443}$$

$$\frac{\xi(\zeta,\nu)}{\frac{\partial}{\partial\nu}\nu\zeta} = 1 \tag{4444}$$

$$\frac{\partial}{\partial\zeta}\frac{\xi(\zeta,\nu)}{\frac{\partial}{\partial\nu}\nu\zeta} = \frac{1}{\frac{\partial}{\partial\zeta}\frac{\partial}{\partial\nu}\nu\zeta} \tag{4445}$$

$$\xi(\zeta,\nu) = \frac{\partial}{\partial\zeta} \tag{4446}$$

$$\nu\xi(\zeta,\nu) = \nu\zeta \tag{4447}$$

$$\frac{\nu\xi(\zeta,\nu) - \cos(\sin(o))}{o} = \frac{\nu\zeta - \cos(\sin(o))}{o} \tag{4448}$$

3.2.9 Derivation 14

$$n(\upsilon) = \cos(\upsilon) \tag{4449}$$

$$\frac{d}{d\upsilon}\nu(\upsilon) = \frac{d}{d\upsilon}\cos(\upsilon) \tag{4450}$$

$$(\frac{d}{d\upsilon}\nu(\upsilon))^{\upsilon} = (\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} \tag{4451}$$

$$(\frac{d}{d\upsilon}\nu(\upsilon))^{\upsilon} = (-\sin(\upsilon))^{\upsilon} \tag{4452}$$

$$(\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} = (-\sin(\upsilon))^{\upsilon} \tag{4453}$$

$$\frac{d}{d\upsilon}(\frac{d}{d\upsilon}\cos(\upsilon))^{\upsilon} = \frac{d}{d\upsilon}(-\sin(\upsilon))^{\upsilon} \tag{4454}$$

3.2.10 Derivation 16

$$\kappa + \frac{d}{d\kappa}\upsilon(\kappa) = \frac{d}{d\kappa}\kappa \tag{4455}$$

$$\frac{d}{d\kappa}(\kappa + \frac{d}{d\kappa}\upsilon(\kappa)) = \frac{d}{d\kappa}(\kappa + \frac{d}{d\kappa}\kappa) \tag{4456}$$

$$\frac{d}{d\kappa}\kappa = 1 \tag{4457}$$

$$\frac{\frac{d}{d\kappa}(\kappa + \frac{d}{d\kappa}\kappa)}{\frac{d}{d\kappa}\kappa} = \frac{1}{\frac{d}{d\kappa}(\kappa + \frac{d}{d\kappa}\kappa)} \tag{4458}$$

$$1 = \frac{1}{\frac{d}{d\kappa}\kappa} \tag{4459}$$

$$1 = \frac{1}{\frac{d}{d\kappa}\kappa} \tag{4460}$$

$$1 = \frac{1}{\frac{d}{d\kappa}\epsilon(\kappa)} \tag{4461}$$

3.2.11 Derivation 17

$$\alpha(\nu) = \cos(\nu) \tag{4462}$$

$$\frac{d}{d\nu}\alpha(\nu) = \frac{d}{d\nu}\cos(\nu) \tag{4463}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = \frac{d^2}{d\nu^2}\cos(\nu) \tag{4464}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = -\cos(\nu) \tag{4465}$$

$$\frac{\frac{d^2}{d\nu^2}\alpha(\nu)}{\tau(\nu)} = -\frac{\cos(\nu)}{\tau(\nu)} \tag{4466}$$

3.2.12 Derivation 19

$$\xi(\zeta) = \int e^{\zeta} d\zeta \tag{4467}$$

$$0 = -\xi(\zeta) + \int e^{\zeta} d\zeta \tag{4468}$$

$$0 = \alpha - \xi(\zeta) + e^{\zeta} \tag{4469}$$

$$0 = (\alpha + e^{\zeta})(\xi(\zeta) + \int e^{\zeta} d\zeta) \tag{4470}$$

$$0 = (\alpha + e^{\zeta})(\xi(\zeta) + \int e^{\zeta} d\zeta) \tag{4471}$$

$$0 = (\alpha + e^{\zeta})(\alpha - \xi(\zeta) + e^{\zeta})^2 \tag{4472}$$

$$0 = (\alpha + e^{\zeta})(\alpha + e^{\zeta} - \int e^{\zeta} d\zeta)^2 \tag{4473}$$

3.2.13 Derivation 20

$$o(\beta,\alpha) = \cos(\alpha + \beta) \tag{4474}$$

$$\int o(\beta,\alpha) d\alpha = \int \cos(\alpha + \beta) d\alpha \tag{4475}$$

$$\int o(\beta,\alpha) d\alpha = \gamma + \sin(\alpha + \beta) \tag{4476}$$

$$\int \cos(\alpha + \beta) d\alpha = \gamma + \sin(\alpha + \beta) \tag{4477}$$

3.2.14 Derivation 23

$$\zeta(\beta) = \cos{(e^{\beta})} \tag{4478}$$

$$\int \zeta(\beta)d\beta = \int \cos{(e^{\beta})}d\beta \tag{4479}$$

$$\int \zeta(\beta)d\beta = \kappa + \mathrm{Ci}\,(e^{\beta}) \tag{4480}$$

$$\iint \zeta(\beta)d\beta d\beta = \int (\kappa + \mathrm{Ci}\,(e^{\beta}))d\beta \tag{4481}$$

$$\frac{d}{d\beta}\iint \zeta(\beta)d\beta d\beta = \frac{\partial}{\partial\beta}\int (\kappa + \mathrm{Ci}\,(e^{\beta}))d\beta \tag{4482}$$

3.2.15 Derivation 24

$$\gamma(\zeta) = \frac{1}{\zeta} \tag{4483}$$

$$\int \gamma(\zeta)d\zeta = \int \frac{1}{\zeta}d\zeta \tag{4484}$$

$$\int \gamma(\zeta)d\zeta = o + \log{(\zeta)} \tag{4485}$$

$$\int \frac{1}{\zeta}d\zeta = o + \log{(\zeta)} \tag{4486}$$

$$-\frac{\beta}{\zeta} + \int \frac{1}{\zeta}d\zeta = -\frac{\beta}{\zeta} + o + \log{(\zeta)} \tag{4487}$$

$$\frac{\partial}{\partial\beta}(-\frac{\beta}{\zeta} + \int \frac{1}{\zeta}d\zeta) = \frac{\partial}{\partial\beta}(-\frac{\beta}{\zeta} + o + \log{(\zeta)}) \tag{4488}$$

3.2.16 Derivation 25

$$\beta(\tau) = e^{\tau} \tag{4489}$$

$$\int \beta(\tau)d\tau = \int e^{\tau}d\tau \tag{4490}$$

$$(\int \beta(\tau)d\tau)^{\tau} = (\int e^{\tau}d\tau)^{\tau} \tag{4491}$$

$$\frac{d}{d\tau}(\int \beta(\tau)d\tau)^{\tau} = \frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{4492}$$

$$\frac{d}{d\tau}(\int \beta(\tau)d\tau)^{\tau} = \frac{\partial}{\partial\tau}(\iota + e^{\tau})^{\tau} \tag{4493}$$

$$\frac{\partial}{\partial\tau}(\iota + \beta(\tau))^{\tau} = \frac{d}{d\tau}(\int e^{\tau}d\tau)^{\tau} \tag{4494}$$

3.2.17 Derivation 29

$$\zeta(\iota) = e^{\iota} \tag{4495}$$

$$\int \zeta(\iota)d\iota = \int e^{\iota}d\iota \tag{4496}$$

$$e^{-\iota}\int \zeta(\iota)d\iota = e^{-\iota}\int e^{\iota}d\iota \tag{4497}$$

$$e^{-\iota}\int \zeta(\iota)d\iota = (\alpha + e^{\iota})e^{-\iota} \tag{4498}$$

$$\frac{\int \zeta(\iota)d\iota}{\zeta(\iota)} = \frac{(\alpha + e^{\iota})e^{-\iota}}{\zeta(\iota)} \tag{4499}$$

$$\frac{\int \zeta(\iota)d\iota}{\zeta(\iota)} = \frac{\alpha + \zeta(\iota)}{\zeta(\iota)} \tag{4500}$$

3.2.18 Derivation 30

$$\xi(\gamma,\tau) = \frac{\partial}{\partial\tau}(\gamma - \tau) \tag{4501}$$

$$\xi^{\tau}(\gamma,\tau) = (\frac{\partial}{\partial\tau}(\gamma - \tau))^{\tau} \tag{4502}$$

$$(\frac{\partial}{\partial\tau}(\gamma-\tau))^{\tau} - (\frac{\partial}{\partial\tau}(\gamma-\tau))^{\tau} = 0^{\tau} - (\frac{\partial}{\partial\tau}(\gamma-\tau))^{\tau} \tag{4503}$$

$$-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau) = 0 \tag{4504}$$

$$\frac{-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau)}{\gamma} = 0 \tag{4505}$$

$$\int \frac{-(-1)^{\tau} + \xi^{\tau}(\gamma,\tau)}{\gamma}d\gamma = \int 0d\gamma \tag{4506}$$

3.2.19 Derivation 32

$$\beta(\tau) = \sin{(\tau)} \tag{4507}$$

$$\frac{d}{d\tau}\beta(\tau) = \frac{d}{d\tau}\sin{(\tau)} \tag{4508}$$

$$\frac{d}{d\tau}\beta(\tau) = \cos{(\tau)} \tag{4509}$$

$$\cos{(t)} = \frac{d}{d\tau}\sin{(\tau)} \tag{4510}$$

$$\beta(\tau)\frac{d}{d\tau}\beta(\tau) = \beta(\tau)\cos{(\tau)} \tag{4511}$$

3.2.20 Derivation 34

$$\iota(\gamma, \tau, \beta) = \frac{\gamma\tau}{\beta} \quad (4512)$$

$$\frac{\partial}{\partial\tau}\iota(\gamma, \tau, \beta) = \frac{\partial}{\partial\tau}\frac{\gamma\tau}{\beta} \quad (4513)$$

$$\frac{\partial}{\partial\tau}\iota(\gamma, \tau, \beta) = \frac{\gamma}{\beta} \quad (4514)$$

$$\frac{\partial}{\partial\tau}\frac{\gamma\tau}{\beta} = \frac{\gamma}{\beta} \quad (4515)$$

$$\iota(\gamma, \tau, \beta) = \frac{\gamma\frac{\partial}{\partial\tau}}{\iota}(\gamma, \tau, \beta) \quad (4516)$$

3.2.21 Derivation 36

$$\beta(\xi, \iota, \alpha) = \alpha - \iota + \xi \quad (4517)$$

$$\int \beta(\xi, \iota, \alpha)d\alpha = \int (\alpha - \iota + \xi)d\alpha \quad (4518)$$

$$\int \beta(\xi, \iota, \alpha)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \quad (4519)$$

$$\int (\alpha - \iota + \xi)d\alpha = \frac{\alpha^2}{2} + \alpha(-\iota + \xi) + \gamma \quad (4520)$$

3.2.22 Derivation 39

$$\gamma(\beta, \nu) = \beta + \nu \quad (4521)$$

$$\int \gamma(\beta, \nu)d\nu = \int (\beta + \nu)d\nu \quad (4522)$$

$$(\int \gamma(\beta, \nu)d\nu)^\beta = (\int (\beta + \nu)d\nu)^\beta \quad (4523)$$

$$(\int \gamma(\beta, \nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \quad (4524)$$

$$(\int (\beta + \nu)d\nu)^\beta = (\beta\nu + \frac{\nu^2}{2} + \tau)^\beta \quad (4525)$$

3.2.23 Derivation 40

$$-\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} \quad (4526)$$

$$\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} + \frac{1}{\zeta} = \frac{d}{d\tau}\frac{\tau}{\zeta} - \frac{1}{\zeta} \quad (4527)$$

$$\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} = \frac{1}{\zeta} \quad (4528)$$

$$\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} - \frac{\partial}{\partial\tau}\frac{\tau}{\zeta} = 0 \quad (4529)$$

$$\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} - \frac{\partial}{\partial\tau}\frac{\tau}{\zeta} = 0 \quad (4530)$$

$$-\frac{\partial}{\partial\tau}\frac{\tau}{\zeta} + \frac{1}{\zeta} = 0 \quad (4531)$$

3.2.24 Derivation 41

$$o(\xi) = e^{e^\xi} \quad (4532)$$

$$\int o(\xi)d\xi = \int e^{e^\xi}d\xi \quad (4533)$$

$$\int o(\xi)d\xi = \iota + \mathrm{Ei}\left(e^\xi\right) \quad (4534)$$

$$\int e^{e^\xi}d\xi = \iota + \mathrm{Ei}\left(e^\xi\right) \quad (4535)$$

$$0 = \iota + \mathrm{Ei}\left(e^\xi\right) - \int e^{e^\xi}d\xi \quad (4536)$$

$$0 = \zeta + \mathrm{Ei}\left(e^\xi\right) - \int o(\xi)d\xi \quad (4537)$$

$$0 = -\iota + \zeta \quad (4538)$$

3.2.25 Derivation 43

$$\alpha(\iota) = \cos(\iota) \quad (4539)$$

$$\int \alpha(\iota)d\iota = \int \cos(\iota)d\iota \quad (4540)$$

$$\frac{d}{d\iota}\int \alpha(\iota)d\iota = \frac{d}{d\iota}\int \cos(\iota)d\iota \quad (4541)$$

$$o + \alpha(\iota) + \sin(\iota) = o + \sin(\iota) + \cos(\iota) \quad (4542)$$

$$\int (o+\alpha(\iota)+\sin(\iota))d\iota = \int (o+\sin(\iota)+\cos(\iota))d\iota \quad (4543)$$

$$-\alpha(\iota)+\int (o+\alpha(\iota)+\sin(\iota))d\iota-\int \cos(\iota)d\iota = -\alpha(\iota)+\int (o+\sin \quad (4544)$$

3.2.26 Derivation 44

$$o(\xi, \zeta) = \frac{\partial}{\partial \zeta}(\xi + \zeta) \tag{4545}$$

$$\zeta o(\xi, \zeta) = \zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) \tag{4546}$$

$$\zeta o(\xi, \zeta) = \zeta \tag{4547}$$

$$\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) = \zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) \tag{4548}$$

$$(\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta))^{\zeta} = (\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta))^{\zeta} \tag{4549}$$

$$\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) + (\zeta \frac{\partial}{\partial \zeta}(\xi + \zeta))^{\zeta} = \zeta \frac{\partial}{\partial \zeta}(\xi + \zeta) + \zeta^{\zeta} \tag{4550}$$

3.2.27 Derivation 45

$$\zeta(\gamma, o) = \frac{o}{\gamma} \tag{4551}$$

$$\frac{\partial}{\partial \gamma}\zeta(\gamma, o) = \frac{\partial}{\partial \gamma}\frac{o}{\gamma} \tag{4552}$$

$$\frac{\partial}{\partial \gamma}\zeta(\gamma, o) = -\frac{o}{\gamma^2} \tag{4553}$$

$$\frac{\partial}{\partial \gamma}\frac{o}{\gamma} = -\frac{o}{\gamma^2} \tag{4554}$$

$$-o + \frac{\partial}{\partial \gamma}\frac{o}{\gamma} = -o - \frac{o}{\gamma^2} \tag{4555}$$

3.2.28 Derivation 46

$$\tau(\kappa) = \sin(\kappa) \tag{4556}$$

$$\int \tau(\kappa) d\kappa = \int \sin(\kappa) d\kappa \tag{4557}$$

$$\int \tau(\kappa) d\kappa = \zeta - \cos(\kappa) \tag{4558}$$

$$\frac{\int \tau(\kappa) d\kappa}{\cos(\kappa)} = \frac{\zeta - \cos(\kappa)}{\cos(\kappa)} \tag{4559}$$

$$\frac{\int \sin(\kappa) d\kappa}{\cos(\kappa)} = \frac{\zeta - \cos(\kappa)}{\cos(\kappa)} \tag{4560}$$

$$-\frac{\int \sin(\kappa) d\kappa}{\cos(\kappa)} = -\frac{\zeta - \cos(\kappa)}{\cos(\kappa)} \tag{4561}$$

3.2.29 Derivation 47

$$o(\kappa) = \kappa \tag{4562}$$

$$\kappa o(\kappa) = \kappa^2 \tag{4563}$$

$$\int \kappa o(\kappa) d\kappa = \int \kappa^2 d\kappa \tag{4564}$$

$$\int \kappa o(\kappa) d\kappa = \iota + \frac{\kappa^3}{3} \tag{4565}$$

$$\int \kappa^2 d\kappa = \iota + \frac{\kappa^3}{3} \tag{4566}$$

$$\frac{\kappa^3}{3} + \xi = \iota + \frac{\kappa^3}{3} \tag{4567}$$

3.2.30 Derivation 48

$$o(\upsilon) = \int \log(\upsilon) d\upsilon \tag{4568}$$

$$o(\upsilon) = \beta + \upsilon \log(\upsilon) - \upsilon \tag{4569}$$

$$-\beta + o(\upsilon) = \upsilon \log(\upsilon) - \upsilon \tag{4570}$$

$$(-\beta + o(\upsilon))^{\upsilon} = (\int \log(\upsilon) d\upsilon)^{\upsilon} \tag{4571}$$

$$\frac{\partial}{\partial \beta}(-\beta + o(\upsilon))^{\upsilon} = \frac{d}{d\beta}(\int \log(\upsilon) d\upsilon)^{\upsilon} \tag{4572}$$

$$\frac{\partial}{\partial \beta}(-\beta + o(\upsilon))^{\upsilon} = \frac{d}{d\beta}(\upsilon \log(\upsilon) - \upsilon)^{\upsilon} \tag{4573}$$

3.2.31 Derivation 49

$$\iota + \int \log(\iota) d\iota \tag{4574}$$

$$\iota + \int \log(\iota) d\iota = \iota + \int \log(\iota) d\iota \tag{4575}$$

$$\iota \log(\iota) - \iota + \zeta = \iota \log(\iota) - \iota + \zeta \tag{4576}$$

$$\iota \log(\iota) + \zeta = \iota + \int \log(\iota) d\iota \tag{4577}$$

3.2.32 Derivation 50

$$\gamma(\beta) = \beta \tag{4578}$$

$$\int \gamma(\beta)d\beta = \int \beta d\beta \tag{4579}$$

$$\int \gamma(\beta)d\beta = \frac{\beta^2}{2} + o \tag{4580}$$

$$\int \gamma(\beta)d\beta = \frac{\beta^2}{2} + o \tag{4581}$$

$$\frac{\int \gamma(\beta)d\beta}{2} = \frac{\gamma^2(\beta)}{2} \tag{4582}$$

$$\int \omega d\beta = \frac{\gamma^2(\beta)}{2} \tag{4583}$$

$$\int \omega d\beta = o + \frac{\gamma^2(\beta)}{2} \tag{4584}$$

$$\alpha + \frac{\gamma^2(\beta)}{2} = \frac{\gamma^2(\beta)}{2} \tag{4585}$$

$$\alpha + \frac{\beta^2}{2} = \frac{\beta^2}{2} + o \tag{4586}$$

3.2.33 Derivation 54

$$\zeta(\tau, \xi) = \frac{\xi}{\tau} \tag{4587}$$

$$\frac{\zeta(\tau, \xi)}{\frac{\xi}{\tau}} = 1 \tag{4588}$$

$$\frac{\frac{\partial}{\partial \tau}\frac{\xi}{\tau}}{\tau} - \frac{\zeta(\tau, \xi)}{\tau^2} = -\frac{2\xi}{\tau^3} \tag{4589}$$

$$\frac{\frac{\partial}{\partial \tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^2} = -\frac{2\xi}{\tau^3} \tag{4590}$$

$$\frac{\frac{\partial}{\partial \tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^3} = -\frac{2\xi}{\tau^3} \tag{4591}$$

3.2.34 Derivation 59

$$\iota(\upsilon) = \log(\upsilon) \tag{4592}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{d}{d\upsilon}\log(\upsilon) \tag{4593}$$

$$\frac{d}{d\upsilon}\iota(\upsilon) = \frac{1}{\upsilon} \tag{4594}$$

$$(\frac{1}{\upsilon})^{\upsilon} = (\frac{d}{d\upsilon}\log(\upsilon))^{\upsilon} \tag{4595}$$

$$((\frac{1}{\upsilon})^{\upsilon})^{\upsilon} = ((\frac{d}{d\upsilon}\log(\upsilon))^{\upsilon})^{\upsilon} \tag{4596}$$

$$(((\frac{1}{\upsilon})^{\upsilon})^{\upsilon})^{\upsilon} = (((\frac{d}{d\upsilon}\log(\upsilon))^{\upsilon})^{\upsilon})^{\upsilon} \tag{4597}$$

3.2.35 Derivation 64

$$\beta(\upsilon) = \log(\upsilon) \tag{4598}$$

$$\int \beta(\upsilon)d\upsilon = \int \log(\upsilon)d\upsilon \tag{4599}$$

$$0 = -\int \beta(\upsilon)d\upsilon + \int \log(\upsilon)d\upsilon \tag{4600}$$

$$0 = \gamma + \upsilon\log(\upsilon) - \int \beta(\upsilon)d\upsilon \tag{4601}$$

$$0 = \gamma + \epsilon\beta(\upsilon) - \int \log(\upsilon)d\upsilon \tag{4602}$$

$$0 = -\int \log(\epsilon)d \int \log(\epsilon)d\gamma \tag{4603}$$

$$0 = -\int \log(\epsilon)d\gamma + \epsilon\beta(\epsilon) - \int \log(\epsilon)d\gamma \tag{4604}$$

$$0 = -\int \log(\epsilon)d\gamma - \int \log(\epsilon)d\gamma \tag{4605}$$

$$0 = -\alpha + \gamma + \epsilon\beta(\epsilon) - \int \log(\epsilon)d\gamma \tag{4606}$$

$$\frac{d}{d\gamma}0 = \frac{\partial}{\partial\gamma}(-\alpha + \gamma + \epsilon\beta(\epsilon) - \int \tag{4607}$$

3.2.36 Derivation 71

$$\gamma(\beta, \kappa) = \beta - \kappa \tag{4608}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta, \kappa) = \frac{\partial}{\partial\beta}(\beta - \kappa) \tag{4609}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta, \kappa) = 1 \tag{4610}$$

$$(\frac{\partial}{\partial\beta}\gamma(\beta, \kappa))^{\beta} = 1 \tag{4611}$$

$$((\frac{\partial}{\partial\beta}\gamma(\beta, \kappa))^{\beta})^{\beta} = 1 \tag{4612}$$

3.2.37 Derivation 72

$$\kappa(\iota) = \cos(\iota) \quad (4613)$$

$$\kappa(\iota)\cos(\iota) = \cos^2(\iota) \quad (4614)$$

$$\int \kappa(\iota)\cos(\iota)d\iota = \int \cos^2(\iota)d\iota \quad (4615)$$

$$\int \kappa(\iota)\cos(\iota)d\iota = \frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} \quad (4616)$$

$$\frac{\iota}{2} + o + \frac{\sin(\iota)\cos(\iota)}{2} = \int \cos^2(\iota)d\iota \quad (4617)$$

3.2.38 Derivation 74

$$\beta(\alpha, o, \nu) = o(\alpha + \nu) \quad (4618)$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \frac{\partial}{\partial o}o(\alpha + \nu) \quad (4619)$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \alpha + \nu \quad (4620)$$

$$\frac{\frac{\partial}{\partial o}\beta(\alpha, o, \nu)}{\nu} = \frac{\frac{\partial}{\partial o}o(\alpha + \nu)}{\nu} \quad (4621)$$

$$\frac{\frac{\partial}{\partial o}\beta(\alpha, o, \nu)}{\nu} = \frac{\alpha + \nu}{\nu} \quad (4622)$$

3.2.39 Derivation 76

$$\kappa(\xi) = \sin(\xi) \quad (4623)$$

$$\frac{d}{d\xi}\kappa(\xi) = \frac{d}{d\xi}\sin(\xi) \quad (4624)$$

$$\frac{d}{d\xi}\kappa(\xi) = \cos(\xi) \quad (4625)$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = \frac{d}{d\xi}\cos(\xi) \quad (4626)$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = -\sin(\xi) \quad (4627)$$

3.2.40 Derivation 78

$$\beta(\upsilon) = \cos(\upsilon) \quad (4628)$$

$$\int \beta(\upsilon)d\upsilon = \int \cos(\upsilon)d\upsilon \quad (4629)$$

$$\int \beta(\upsilon)d\upsilon + 1 = \int \cos(\upsilon)d\upsilon + 1 \quad (4630)$$

$$\int \cos(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \quad (4631)$$

$$\int \cos(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \quad (4632)$$

$$\tau + \sin(\upsilon) + 1 = \gamma + \sin(\upsilon) + 1 \quad (4633)$$

$$(\tau + \sin(\upsilon) + 1)^\gamma = (\gamma + \sin(\upsilon) + 1)^\gamma \quad (4634)$$

3.2.41 Derivation 79

$$\alpha(o) = \sin(o) \quad (4635)$$

$$0 = -\alpha(o) + \sin(o) \quad (4636)$$

$$\frac{d}{do}0 = \frac{d}{do}(-\alpha(o) + \sin(o)) \quad (4637)$$

$$0 = \cos(o) - \frac{d}{do}\alpha(o) \quad (4638)$$

$$\int 0 do = \int (\cos(o) - \frac{d}{do}\alpha(o))do \quad (4639)$$

3.2.42 Derivation 80

$$\xi(\beta, \upsilon) = \frac{\upsilon}{\beta} \quad (4640)$$

$$\frac{\partial}{\partial \beta}\xi(\beta, \upsilon) = \frac{\partial}{\partial \beta}\frac{\upsilon}{\beta} \quad (4641)$$

$$\frac{\partial}{\partial \beta}\xi(\beta, \upsilon) = -\frac{\upsilon}{\beta^2} \quad (4642)$$

$$\frac{\partial}{\partial \beta}\frac{\upsilon}{\beta} = -\frac{\upsilon}{\beta^2} \quad (4643)$$

3.2.43 Derivation 81

$$\beta(\zeta) = \int \sin(\zeta) d\zeta \tag{4644}$$

$$\beta(\zeta) = \alpha - \cos(\zeta) \tag{4645}$$

$$\int \sin(\zeta) d\zeta = \alpha - \cos(\zeta) \tag{4646}$$

$$-\beta(\zeta) = -\int \sin(\zeta) d\zeta \tag{4647}$$

$$-\cos(\zeta) = -\int \sin(\zeta) d\zeta \tag{4648}$$

$$-\beta(\zeta) = -\int \sin(\zeta) d\zeta \tag{4649}$$

$$-\beta(\zeta) = -\int \sin(\zeta) d\zeta \tag{4650}$$

$$(-\beta(\zeta))^{\upsilon} = (-\int \sin(\zeta) d\zeta)^{\upsilon} \tag{4651}$$

$$(-\beta(\zeta))^{\upsilon} = (-\alpha + \cos(\zeta))^{\upsilon} \tag{4652}$$

3.2.44 Derivation 83

$$-\frac{\kappa}{o} + \tau \tag{4653}$$

$$0 = -\frac{\kappa}{o} + \tau - \frac{1}{o} \tag{4654}$$

$$\frac{d}{d\kappa} 0 = \frac{\partial}{\partial \kappa}(-\frac{\kappa}{o} + \tau - \frac{1}{o}) \tag{4655}$$

$$\frac{d}{d\kappa} 0 = \frac{\partial}{\partial \kappa}(-\frac{\kappa}{o} + \tau - \frac{1}{o}) \tag{4656}$$

$$0 = -\frac{\partial}{\partial \kappa} \upsilon(\kappa, \tau, o) + \frac{1}{o} \tag{4657}$$

$$0 = -\frac{\partial}{\partial \kappa}(\frac{\kappa}{o} + \tau) + \frac{1}{o} \tag{4658}$$

3.2.45 Derivation 84

$$o(\beta) = \int e^{\beta} d\beta \tag{4659}$$

$$o(\beta) e^{\beta} = e^{\beta} \int e^{\beta} d\beta \tag{4660}$$

$$(\tau + e^{\beta}) e^{\beta} = (\zeta + e^{\beta}) e^{\beta} \tag{4661}$$

$$(\zeta + e^{\beta}) e^{\beta} = e^{\beta} \int e^{\beta} d\beta \tag{4662}$$

$$((\zeta + e^{\beta}) e^{\beta})^{\zeta} = (e^{\beta} \int e^{\beta} d\beta)^{\zeta} \tag{4663}$$

$$e^{((\zeta + e^{\beta}) e^{\beta})^{\zeta}} = e^{(e^{\beta} \int e^{\beta} d\beta)^{\zeta}} \tag{4664}$$

3.2.46 Derivation 85

$$\beta(\zeta) = e^{\zeta} \tag{4665}$$

$$\frac{d}{d\zeta} \beta(\zeta) = \frac{d}{d\zeta} e^{\zeta} \tag{4666}$$

$$\frac{d}{d\zeta} \beta(\zeta) = e^{\zeta} \tag{4667}$$

$$\frac{d}{d\zeta} \beta(\zeta) = \frac{d^2}{d\zeta^2} \beta(\zeta) \tag{4668}$$

$$\zeta + \frac{d}{d\zeta} \beta(\zeta) = \zeta + \frac{d^2}{d\zeta^2} \beta(\zeta) \tag{4669}$$

3.2.47 Derivation 87

$$o(\upsilon, \kappa) = \int (\kappa + \upsilon) d\kappa \tag{4670}$$

$$o(\upsilon, \kappa) = \frac{\kappa^2}{2} + \kappa\upsilon + \nu \tag{4671}$$

$$\frac{\kappa^2}{2} + \kappa\upsilon + \nu = \frac{\kappa^2}{2} + 2\kappa\upsilon + \nu \tag{4672}$$

$$\frac{\kappa^2}{2} + \kappa\upsilon + \nu + \int (\kappa + \upsilon) d\kappa = \kappa^2 + 2\kappa\upsilon + 2\nu \tag{4673}$$

3.2.48 Derivation 93

$$\xi(\kappa,\nu) = \int(\kappa-\nu)d\nu \tag{4674}$$

$$\xi^{\nu}(\kappa,\nu) = (\int(\kappa-\nu)d\nu)^{\nu} \tag{4675}$$

$$\xi^{\nu}(\kappa,\nu) = (\kappa\nu-\frac{\nu^2}{2}+o)^{\nu} \tag{4676}$$

$$(\kappa\nu-\frac{\nu^2}{2}+o)^{\nu} = (\int(\kappa-\nu)d\nu)^{\nu} \tag{4677}$$

$$(\kappa\nu-\frac{\nu^2}{2}+o)^{\nu} = (\gamma+\kappa\nu-\frac{\nu^2}{2})^{\nu} \tag{4678}$$

$$\xi^{\nu}(\kappa,\nu) = (\gamma+\kappa\nu-\frac{\nu^2}{2})^{\nu} \tag{4679}$$

3.2.49 Derivation 96

$$\tau(\iota,\beta) = \frac{\beta}{\iota} \tag{4680}$$

$$\frac{\partial}{\partial\beta}\tau(\iota,\beta) = \frac{\partial}{\partial\beta}\frac{\beta}{\iota} \tag{4681}$$

$$\frac{\partial}{\partial\beta}\tau(\iota,\beta) = \frac{1}{\iota} \tag{4682}$$

$$\frac{\partial}{\partial\beta}\frac{\beta}{\iota} = \frac{1}{\iota} \tag{4683}$$

$$\frac{\frac{\partial}{\partial\beta}\tau(\iota,\beta)}{\iota} = \iota^{-1-\frac{\iota\frac{\beta}{\iota}}{\beta}} \tag{4684}$$

$$\frac{\frac{\partial}{\partial\beta}\tau(\iota,\beta)}{\iota} = \iota^{-1-\frac{\iota\tau(\iota,\beta)}{\beta}} \tag{4685}$$

3.2.50 Derivation 98

$$\alpha(\kappa) = \log{(\kappa)} \tag{4686}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{d}{d\kappa}\log{(\kappa)} \tag{4687}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{4688}$$

$$\frac{d}{d\kappa}\log{(\kappa)} = \frac{1}{\kappa} \tag{4689}$$

$$(\frac{d}{d\kappa}\log{(\kappa)})^{-\kappa}\frac{d}{d\kappa}\log{(\kappa)} = \frac{(\frac{d}{d\kappa}\log{(\kappa)})^{-\kappa}}{\kappa} \tag{4690}$$

$$(\frac{d}{d\kappa}\alpha(\kappa))^{-\kappa}\frac{d}{d\kappa}\log{(\kappa)} = \frac{(\frac{d}{d\kappa}\alpha(\kappa))^{-\kappa}}{\kappa} \tag{4691}$$

3.3 Perturbation: EE

3.3.1 Derivation 1

$$\frac{d}{d\mathbf{s}}\sin{(\mathbf{s})} = \mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{4692}$$

$$\frac{d}{d\mathbf{s}}\sin{(\mathbf{s})} = \frac{d^2}{d\mathbf{s}^2}\sin{(\mathbf{s})} \tag{4693}$$

$$-\sin{(\mathbf{s})} = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{4694}$$

$$-\sin{(\mathbf{s})} = \frac{d^2}{d\mathbf{s}^2}\sin{(\mathbf{s})} \tag{4695}$$

3.3.2 Derivation 3

$$\hat{x}_0\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0 = m(\hat{x}_0,\mathbf{r}) \tag{4696}$$

$$\hat{x}_0\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0 = \hat{x}_0 m(\hat{x}_0,\mathbf{r}) \tag{4697}$$

$$\hat{x}_0(\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r}) = \hat{x}_0 m(\hat{x}_0,\mathbf{r}) \tag{4698}$$

$$\hat{x}_0(\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r}) = \hat{x}_0\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0 \tag{4699}$$

3.3.3 Derivation 4

$$\sin{(P_e)} = \mathrm{V}_{\mathbf{B}}(P_e) \tag{4700}$$

$$\frac{d}{dP_e}\sin{(P_e)} = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) \tag{4701}$$

$$\cos{(P_e)} = \frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) \tag{4702}$$

$$\cos{(P_e)} = \frac{d}{dP_e}\sin{(P_e)} \tag{4703}$$

$$\frac{\cos{(P_e)}}{P_e} = \frac{\frac{d}{dP_e}\sin{(P_e)}}{P_e} \tag{4704}$$

$$-1+\frac{\cos{(P_e)}}{P_e} = -1+\frac{\frac{d}{dP_e}\sin{(P_e)}}{P_e} \tag{4705}$$

3.3.4 Derivation 6

$$\cos{(J)} = \mathbf{M}(J) \tag{4706}$$

$$\int \cos{(J)} dJ = \int \mathbf{M}(J) dJ \tag{4707}$$

$$\int \cos{(J)} dJ = \int \mathbf{M}(J) dJ \tag{4708}$$

$$(\int \cos{(J)} dJ)^{F_g} = (\int \mathbf{M}(J) dJ)^{F_g} \tag{4709}$$

$$F_g + \sin{(J)} = \int \mathbf{M}(J) dJ \tag{4710}$$

$$(F_g+\sin{(J)})^{F_g}+(\int \cos{(J)} dJ)^{F_g} = 2(F_g+\sin{(J)})^{F_g} \tag{4711}$$

$$\int ((F_g+\sin{(J)})^{F_g}+(\int \cos{(J)} dJ)^{F_g}) dF_g = \int 2(F_g+\sin{(J)})^{F_g} dF_g \tag{4712}$$

3.3.5 Derivation 7

$$\sin{(\mathbf{p})} = \mathrm{C_d}\left(\mathbf{p}\right) \tag{4713}$$

$$\frac{d}{d\mathbf{p}} \sin{(\mathbf{p})} = \frac{d}{d\mathbf{p}} \mathrm{C_d}\left(\mathbf{p}\right) \tag{4714}$$

$$\cos{(\mathbf{p})} = \frac{d}{d\mathbf{p}} \mathrm{C_d}\left(\mathbf{p}\right) \tag{4715}$$

$$\frac{d}{d\mathbf{p}} \sin{(\mathbf{p})} = \cos{(\mathbf{p})} \tag{4716}$$

$$F_c \frac{d}{d\mathbf{p}} \sin{(\mathbf{p})} = F_c \cos{(\mathbf{p})} \tag{4717}$$

$$\int F_c \frac{d}{d\mathbf{p}} \sin{(\mathbf{p})} dF_c = \int F_c \cos{(\mathbf{p})} dF_c \tag{4718}$$

3.3.6 Derivation 9

$$\frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) = \hat{p}_0(\phi, \mathbf{H}) \tag{4719}$$

$$1 = \frac{\hat{p}_0(\phi, \mathbf{H})}{\frac{\partial}{\partial \phi}(-\mathbf{H} + \phi)} \tag{4720}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{4721}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{4722}$$

$$\frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi) = 0 \tag{4723}$$

$$-2\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi) = -2\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi) \tag{4724}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)-1 \tag{4725}$$

3.3.7 Derivation 10

$$\cos{(q)} = \theta(q) \tag{4726}$$

$$\frac{d}{dq} \cos{(q)} = \frac{d}{dq}\theta(q) \tag{4727}$$

$$\frac{d}{dq} \cos{(q)} = \frac{d^2}{dq^2}\theta(q) \tag{4728}$$

$$-\sin{(q)} = \frac{d}{dq}\theta(q) \tag{4729}$$

$$\frac{d}{dq} \cos{(q)} = \frac{d^2}{dq^2}\theta(q) \tag{4730}$$

$$(\frac{d}{dq} \cos{(q)})^q = (\frac{d^2}{dq^2}\theta(q))^q \tag{4731}$$

$$(-\sin{(q)})^q(\frac{d}{dq} \cos{(q)})^q = (-\sin{(q)})^{2q} \tag{4732}$$

3.3.8 Derivation 13

$$\frac{\partial}{\partial \mathbf{P}} Q\mathbf{P} = \mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) \tag{4733}$$

$$Q\mathbf{P} = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) \tag{4734}$$

$$\frac{\partial}{\partial \mathbf{P}} Q\mathbf{P} = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) \tag{4735}$$

$$Q\mathbf{P} = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) \tag{4736}$$

$$Q\mathbf{P} - \cos\left(\sin\left(J\right)\right) = \mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) - \cos\left(\sin\left(J\right)\right) \tag{4737}$$

$$\frac{Q\mathbf{P} - \cos\left(\sin\left(J\right)\right)}{J} = \frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q, \mathbf{P}\right) - \cos\left(\sin\left(J\right)\right)}{J} \tag{4738}$$

3.3.9 Derivation 14

$$\cos\left(u\right) = \mathrm{a}^{\dagger}\left(u\right) \tag{4739}$$

$$\frac{d}{du}\cos\left(u\right) = \frac{d}{du}\mathrm{a}^{\dagger}\left(u\right) \tag{4740}$$

$$\left(\frac{d}{du}\cos\left(u\right)\right)^{u} = \left(\frac{d}{du}\mathrm{a}^{\dagger}\left(u\right)\right)^{u} \tag{4741}$$

$$\left(-\sin\left(u\right)\right)^{u} = \left(\frac{d}{du}\mathrm{a}^{\dagger}\left(u\right)\right)^{u} \tag{4742}$$

$$\left(-\sin\left(u\right)\right)^{u} = \left(\frac{d}{du}\cos\left(u\right)\right)^{u} \tag{4743}$$

$$\frac{d}{du}\left(-\sin\left(u\right)\right)^{u} = \frac{d}{du}\left(\frac{d}{du}\cos\left(u\right)\right)^{u} \tag{4744}$$

3.3.10 Derivation 16

$$c_d = f(C_d) \tag{4745}$$

$$\frac{d}{dC_d}C_d = \frac{d}{dC_d}f(C_d) \tag{4746}$$

$$1 = \frac{\frac{d}{dC_d}f(C_d)}{\frac{d}{dC_d}C_d} \tag{4747}$$

$$1 = \frac{d}{dC_d}f(C_d) \tag{4748}$$

$$\frac{1}{\frac{d}{dC_d}C_d} = 1 \tag{4749}$$

$$\frac{1}{\frac{d}{df(C_d)}f(C_d)} = 1 \tag{4750}$$

3.3.11 Derivation 17

$$\cos\left(f'\right) = \hat{X}(f') \tag{4751}$$

$$\frac{d}{df'}\cos\left(f'\right) = \frac{d}{df'}\hat{X}(f') \tag{4752}$$

$$\frac{d^2}{d(f')^2}\cos\left(f'\right) = \frac{d^2}{d(f')^2}\hat{X}(f') \tag{4753}$$

$$-\cos\left(f'\right) = \frac{d^2}{d(f')^2}\hat{X}(f') \tag{4754}$$

$$-\cos\left(f'\right) = \frac{d^2}{d(f')^2}\cos\left(f'\right) \tag{4755}$$

$$-\cos\left(f'\right) = \frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\left(f'\right)} \tag{4756}$$

3.3.12 Derivation 19

$$\mathrm{E}_{\lambda}\left(\hat{H}_l\right) = \mathrm{E}_{\lambda}\left(\hat{H}_l\right) \tag{4757}$$

$$\int e^{\hat{H}_l}d\hat{H}_l = \int e^{\hat{H}_l}d\hat{H}_l \tag{4758}$$

$$\mathrm{E}_{\lambda}\left(\hat{H}_l\right) - \int e^{\hat{H}_l}d\hat{H}_l = 0 \tag{4759}$$

$$A_y + e^{\hat{H}_l} = A_y - \mathrm{E}_{\lambda}\left(\hat{H}_l\right) + e^{\hat{H}_l} \tag{4760}$$

$$(A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_{\lambda}\left(\hat{H}_l\right) + e^{\hat{H}_l})^2 = 0 \tag{4761}$$

$$(A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 = 0 \tag{4762}$$

3.3.13 Derivation 20

$$\cos\left(V_{\mathbf{B}} + \mu_0\right) = \mathrm{n}_2\left(V_{\mathbf{B}}, \mu_0\right) \tag{4763}$$

$$\int \cos\left(V_{\mathbf{B}} + \mu_0\right)d\mu_0 = \int \mathrm{n}_2\left(V_{\mathbf{B}}, \mu_0\right)d\mu_0 \tag{4764}$$

$$C_2 + \sin\left(V_{\mathbf{B}} + \mu_0\right) = \int \mathrm{n}_2\left(V_{\mathbf{B}}, \mu_0\right)d\mu_0 \tag{4765}$$

$$C_2 + \sin\left(V_{\mathbf{B}} + \mu_0\right) = \int \cos\left(V_{\mathbf{B}} + \mu_0\right)d\mu_0 \tag{4766}$$

3.3.14 Derivation 23

$$\cos{(e^{\phi})} = \mathbf{p}(\phi) \tag{4767}$$

$$\int \cos{(e^{\phi})} d\phi = \int \mathbf{p}(\phi) d\phi \tag{4768}$$

$$\int \cos{(e^{\phi})} d\phi = \int \mathbf{p}(\phi) d\phi \tag{4769}$$

$$\omega + \operatorname{Ci}{(e^{\phi})} = \int \mathbf{p}(\phi) d\phi \tag{4770}$$

$$\int (\omega + \operatorname{Ci}{(e^{\phi})}) d\phi = \iint \mathbf{p}(\phi) d\phi d\phi \tag{4771}$$

$$\frac{\partial}{\partial \phi} \int (\omega + \operatorname{Ci}{(e^{\phi})}) d\phi = \frac{d}{d\phi} \iint \mathbf{p}(\phi) d\phi d\phi \tag{4772}$$

3.3.15 Derivation 24

$$\frac{1}{A_x} = y(A_x) \tag{4773}$$

$$\int \frac{1}{A_x} dA_x = \int y(A_x) dA_x \tag{4774}$$

$$\int \frac{1}{A_x} dA_x - \frac{x}{A_x} = \int y(A_x) dA_x \tag{4775}$$

$$\varepsilon_0 + \log{(A_x)} = \int y(A_x) dA_x \tag{4776}$$

$$\varepsilon_0 + \log{(A_x)} - \frac{x}{A_x} = \int \frac{1}{A_x} dA_x - \frac{x}{A_x} \tag{4777}$$

$$\frac{\partial}{\partial x}(\varepsilon_0 + \log{(A_x)} - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\int \frac{1}{A_x} dA_x - \frac{x}{A_x}) \tag{4778}$$

3.3.16 Derivation 25

$$\theta_1(g) = e^g \tag{4779}$$

$$\int \theta_1(g) dg = \int e^g dg \tag{4780}$$

$$(\int \theta_1(g) dg)^g = (\int e^g dg)^g \tag{4781}$$

$$\frac{d}{dg}(\int \theta_1(g) dg)^g = \frac{d}{dg}(\int e^g dg)^g \tag{4782}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{d}{dg}(\int \theta_1(g) dg)^g \tag{4783}$$

$$\frac{d}{dg}(\int e^g dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^g \tag{4784}$$

3.3.17 Derivation 29

$$e^{c_0} = q(c_0) \tag{4785}$$

$$\int e^{c_0} dc_0 = \int q(c_0) dc_0 \tag{4786}$$

$$(\int e^{c_0} dc_0) e^{-c_0} = (\int q(c_0) dc_0) e^{-c_0} \tag{4787}$$

$$(n + e^{c_0}) e^{-c_0} = e^{-c_0} \int q(c_0) dc_0 \tag{4788}$$

$$(n + e^{c_0}) e^{-c_0} = e^{-c_0} \int q(c_0) dc_0 \tag{4789}$$

$$\frac{n + e^{c_0}}{q(c_0)} = \frac{\int q(c_0) dc_0}{q(c_0)} \tag{4790}$$

$$\frac{n + q(c_0)}{q(c_0)} = \frac{\int q(c_0) dc_0}{q(c_0)} \tag{4791}$$

3.3.18 Derivation 30

$$\frac{\partial}{\partial A_x}(-A_x + i) = b(A_x, i) \tag{4792}$$

$$0 = -\frac{\partial}{\partial A_x}(-A_x + i) + \frac{\partial}{\partial A_x}(-A_x + i) \tag{4793}$$

$$0 = -(-1)^{A_x} + b^{A_x}(A_x, i) \tag{4794}$$

$$0 = \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} \tag{4795}$$

$$\int 0 di = \int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} di \tag{4796}$$

3.3.19 Derivation 32

$$\sin{(\dot{z})} = \operatorname{P_e}{(\dot{z})} \tag{4797}$$

$$\frac{d}{d\dot{z}} \sin{(\dot{z})} = \frac{d}{d\dot{z}} \operatorname{P_e}{(\dot{z})} \tag{4798}$$

$$\cos{(\dot{z})} = \frac{d}{d\dot{z}} \operatorname{P_e}{(\dot{z})} \tag{4799}$$

$$\sin{(\dot{z})} \cos{(\dot{z})} = \sin{(\dot{z})} \frac{d}{d\dot{z}} \operatorname{P_e}{(\dot{z})} \tag{4800}$$

$$\operatorname{P_e}{(\dot{z})} \cos{(\dot{z})} = \operatorname{P_e}{(\dot{z})} \frac{d}{d\dot{z}} \operatorname{P_e}{(\dot{z})} \tag{4801}$$

3.3.20 Derivation 34

$$\frac{\mathbf{f}\varepsilon}{v_1} = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (4802)$$

$$\frac{\partial}{\partial \mathbf{f}} \frac{\mathbf{f}\varepsilon}{v_1} = \frac{\partial}{\partial \mathbf{f}} \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (4803)$$

$$\frac{\varepsilon}{v_1} = \frac{\partial}{\partial \mathbf{f}} \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (4804)$$

$$\mathbf{f} \frac{\partial}{\partial \mathbf{f}} \dot{x}(v_1, \mathbf{f}, \varepsilon) = \dot{x}(v_1, \mathbf{f}, \varepsilon) \quad (4805)$$

3.3.21 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = \mathrm{f}'(\dot{z}, V, A) \quad (4806)$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \int \mathrm{f}'(\dot{z}, V, A) dV \quad (4807)$$

$$V + \int \mathrm{f}'(\dot{z}, V, A) dV = V + \int \mathrm{f}'(\dot{z}, V, A) dV \quad (4808)$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int \mathrm{f}'(\dot{z}, V, A) dV \quad (4809)$$

$$\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} = \int (A + V - \dot{z}) dV \quad (4810)$$

3.3.22 Derivation 39

$$\mathbf{A} + \varepsilon_0 = M(\mathbf{A}, \varepsilon_0) \quad (4811)$$

$$\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \quad (4812)$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \quad (4813)$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \quad (4814)$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \quad (4815)$$

3.3.23 Derivation 40

$$\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = \hat{p}(k, \hat{H}_\lambda) \quad (4816)$$

$$\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = \hat{p}(k, \hat{H}_\lambda) \quad (4817)$$

$$\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = \frac{1}{k} \quad (4818)$$

$$0 = -\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} + \frac{1}{k} \quad (4819)$$

3.3.24 Derivation 41

$$\mathrm{F_x}(\pi) = \mathrm{F_x}(\pi) \quad (4820)$$

$$\int e^{e^\pi} d\pi = \int \mathrm{F_x}(\pi) d\pi \quad (4821)$$

$$\int e^{e^\pi} d\pi - \int \mathrm{F_x}(\pi) d\pi = 0 \quad (4822)$$

$$P_g + \mathrm{Ei}(e^\pi) = \int \mathrm{F_x}(\pi) d\pi \quad (4823)$$

$$\int e^{e^\pi} d\pi = P_g + \mathrm{Ei}(e^\pi) \quad (4824)$$

$$F_g + \mathrm{Ei}(e^\pi) - \int e^{e^\pi} d\pi = 0 \quad (4825)$$

$$F_g + \mathrm{Ei}(e^\pi) - \int \mathrm{F_x}(\pi) d\pi = 0 \quad (4826)$$

$$F_g - P_g = 0 \quad (4827)$$

3.3.25 Derivation 43

$$\cos(\nabla) = G(\nabla) \quad (4828)$$

$$\int \cos(\nabla) d\nabla = \int G(\nabla) d\nabla \quad (4829)$$

$$\varphi + \sin(\nabla) + \cos(\nabla) = \varphi + G(\nabla) + \sin(\nabla) \quad (4830)$$

$$\varphi + \sin(\nabla) + \cos(\nabla) = \varphi + G(\nabla) + \sin(\nabla) \quad (4831)$$

$$\int(\varphi+\sin(\nabla)+\cos(\nabla))d\nabla=\int(\varphi+G(\nabla)+\sin(\nabla))d\nabla \tag{4832}$$

$$-G(\nabla)+\int(\varphi+\sin(\nabla)+\cos(\nabla))d\nabla-\int\cos(\nabla)d\nabla=-G(\nabla)+\int(\varphi+G(\nabla)+\sin(\nabla))d\nabla-\int\cos(\nabla)d\nabla \tag{4833}$$

3.3.26 Derivation 44

$$\frac{\partial}{\partial f^*}(\pi+f^*)=\nabla(f^*,\pi) \tag{4834}$$

$$f^*=f^*\nabla(f^*,\pi) \tag{4835}$$

$$\frac{\partial}{\partial f^*}(\pi+f^*)=f^*\nabla(f^*,\pi) \tag{4836}$$

$$f^*=f^*\nabla(f^*,\pi) \tag{4837}$$

$$f^*=f^*\frac{\partial}{\partial f^*}(\pi+f^*) \tag{4838}$$

$$f^*=f^*\frac{\partial}{\partial f^*}(\pi+f^*) \tag{4839}$$

$$f^*\frac{\partial}{\partial f^*}(\pi+f^*)=f^*\frac{\partial}{\partial f^*}(\pi+f^*) \tag{4840}$$

$$f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*)^{f^*}=f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*} \tag{4841}$$

3.3.27 Derivation 45

$$\frac{F_x}{\mathbf{r}}=\eta'(\mathbf{r},F_x) \tag{4842}$$

$$-\frac{F_x}{\mathbf{r}}=-\frac{F_x}{\mathbf{r}}+\eta'(\mathbf{r},F_x) \tag{4843}$$

$$\frac{\partial}{\partial\mathbf{r}}-\frac{F_x}{\mathbf{r}}=\frac{\partial}{\partial\mathbf{r}}(-\frac{F_x}{\mathbf{r}}+\eta'(\mathbf{r},F_x)) \tag{4844}$$

$$-\frac{F_x}{\mathbf{r}^2}=\frac{\partial}{\partial\mathbf{r}}\eta'(\mathbf{r},F_x) \tag{4845}$$

$$-\frac{F_x}{\mathbf{r}^2}=\frac{\partial}{\partial\mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{4846}$$

$$-F_x-\frac{F_x}{\mathbf{r}^2}=-F_x+\frac{\partial}{\partial\mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{4847}$$

3.3.28 Derivation 46

$$\sin(\lambda)=u(\lambda) \tag{4848}$$

$$\int\sin(\lambda)d\lambda=\int u(\lambda)d\lambda \tag{4849}$$

$$\frac{\int\sin(\lambda)d\lambda}{\cos(\lambda)}=\frac{\int u(\lambda)d\lambda}{\cos(\lambda)} \tag{4850}$$

$$n-\cos(\lambda)=\int u(\lambda)d\lambda \tag{4851}$$

$$n-\cos(\lambda)=\int\sin(\lambda)d\lambda \tag{4852}$$

$$-n-\cos(\lambda)=-\frac{\int\sin(\lambda)d\lambda}{\cos(\lambda)} \tag{4853}$$

3.3.29 Derivation 47

$$phi_1=\mathrm{f}'(\phi_1) \tag{4854}$$

$$\phi_1\,\mathrm{f}'(\phi_1)=\phi_1\,\mathrm{f}'(\phi_1) \tag{4855}$$

$$\int\phi_1\,\mathrm{f}'(\phi_1)d\phi_1=\int\phi_1\,\mathrm{f}'(\phi_1)d\phi_1 \tag{4856}$$

$$\int\phi_1\,\mathrm{f}'(\phi_1)d\phi_1=\int\phi_1\,\mathrm{f}'(\phi_1)d\phi_1 \tag{4857}$$

$$\hbar+\frac{\phi_1^3}{3}=\int\phi_1\,\mathrm{f}'(\phi_1)d\phi_1 \tag{4858}$$

$$\hbar+\frac{\phi_1^3}{3}=\frac{\phi_1^3}{3}+n_2 \tag{4859}$$

3.3.30 Derivation 48

$$int\log(\omega)d\omega=\mathrm{a}^\dagger(\omega) \tag{4860}$$

$$\int\log(\omega)d\omega=\int\mathrm{a}^\dagger(\omega)d\omega \tag{4861}$$

$$\omega\log(\omega)-\omega+\rho=\omega\log(\omega)-\omega+\mathrm{a}^\dagger(\omega) \tag{4862}$$

$$(\omega\log(\omega)-\omega)^\omega=(\omega\log(\omega)-\omega)^\omega \tag{4863}$$

$$\frac{d}{d\rho}(\omega\log(\omega)-\omega)^\omega=\frac{\partial}{\partial\rho}(-\rho+\mathrm{a}^\dagger(\omega))^\omega \tag{4864}$$

3.3.31 Derivation 49

$$int \log{(f)}df = \hat{x}(f) \tag{4865}$$

$$\int \log{(f)}df = \hat{x}(f) \tag{4866}$$

$$f + \int \log{(f)}df = f + \hat{x}(f) \tag{4867}$$

$$B + f\log{(f)} - f = \hat{x}(f) \tag{4868}$$

$$f + \int \log{(f)}df = B + f\log{(f)} \tag{4869}$$

3.3.32 Derivation 50

$$\mathbf{v}(C_2) = \mathbf{v}(C_2) \tag{4870}$$

$$\int C_2 dC_2 = \int \mathbf{v}(C_2)dC_2 \tag{4871}$$

$$\int C_2 dC_2 = \int \mathbf{v}(C_2)dC_2 \tag{4872}$$

$$\frac{C_2^2}{2} + v = \int \mathbf{v}(C_2)dC_2 \tag{4873}$$

$$\frac{C_2^2}{2} + v = \mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} \tag{4874}$$

$$v + \frac{\mathbf{v}^2(C_2)}{2} = \mathbf{p} + \frac{\mathbf{v}^2(C_2)}{2} \tag{4875}$$

$$\frac{C_2^2}{2} + v = \frac{C_2^2}{2} + \mathbf{p} \tag{4876}$$

3.3.33 Derivation 54

$$\frac{r_0}{\mathbf{P}} = E(r_0, \mathbf{P}) \tag{4877}$$

$$\frac{r_0}{\mathbf{P}}\frac{r_0}{\mathbf{P}} = \frac{r_0}{\mathbf{P}}E(r_0, \mathbf{P}) \tag{4878}$$

$$\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) \tag{4879}$$

$$-\frac{r_0}{\mathbf{P}} + \frac{r_0}{\mathbf{P}} = -\frac{r_0}{\mathbf{P}} + \frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) \tag{4880}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{4881}$$

3.3.34 Derivation 59

$$\log{(\psi^*)} = \mathrm{M_E}\left(\psi^*\right) \tag{4882}$$

$$\frac{d}{d\psi^*}\log{(\psi^*)} = \frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) \tag{4883}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\mathrm{M_E}\left(\psi^*\right) \tag{4884}$$

$$\frac{d}{d\psi^*}\log{(\psi^*)} = \frac{1}{\psi^*} \tag{4885}$$

$$(\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*} = (\frac{1}{\psi^*})^{\psi^*} \tag{4886}$$

$$((\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*})^{\psi^*} = ((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} \tag{4887}$$

$$(((\frac{d}{d\psi^*}\log{(\psi^*)})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} \tag{4888}$$

3.3.35 Derivation 64

$$\log{(q)} = \delta(q) \tag{4889}$$

$$\int \log{(q)}dq = \int \delta(q)dq \tag{4890}$$

$$\int \log{(q)}dq - \int \delta(q)dq = 0 \tag{4891}$$

$$A_2 + q\log{(q)} - q - \int \delta(q)dq = 0 \tag{4892}$$

$$A_2 + q\log{(q)} - q\log{(q)} = 0 \tag{4893}$$

$$A_2 - m_s + q\delta(q) - q\log{(q)} = 0 \tag{4894}$$

$$\frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log{(q)}) = \frac{d}{dA_2}0 \tag{4895}$$

3.3.36 Derivation 71

$$\mathrm{v_x}\left(G, L\right) = \mathrm{v_x}\left(G, L\right) \tag{4896}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) = \frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) \tag{4897}$$

$$1 = \frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) \tag{4898}$$

$$1 = \frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) \tag{4899}$$

$$1 = (\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^{G} \tag{4900}$$

$$1 = ((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^{G})^{G} \tag{4901}$$

$$1 = (((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^{G})^{G})^{G} \tag{4902}$$

3.3.37 Derivation 72

$$\cos\left(\theta_1\right) = \mathrm{A_1}\left(\theta_1\right) \tag{4903}$$

$$\cos\left(\theta_1\right)\mathrm{A_1}\left(\theta_1\right) = \cos^2\left(\theta_1\right) \tag{4904}$$

$$\int\cos\left(\theta_1\right)\mathrm{A_1}\left(\theta_1\right)d\theta_1 = \int\mathrm{A_1}\left(\theta_1\right)\cos\left(\theta_1\right)d\theta_1 \tag{4905}$$

$$\frac{\theta_1}{2}+t_2+\frac{\sin\left(\theta_1\right)\cos\left(\theta_1\right)}{2} = \int\mathrm{A_1}\left(\theta_1\right)\cos\left(\theta_1\right)d\theta_1 \tag{4906}$$

$$\int\cos^2\left(\theta_1\right)d\theta_1 = \frac{\theta_1}{2}+t_2+\frac{\sin\left(\theta_1\right)\cos\left(\theta_1\right)}{2} \tag{4907}$$

3.3.38 Derivation 74

$$s(\mathbf{J}_P+\rho_b) = \Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{4908}$$

$$\frac{\partial}{\partial s}s(\mathbf{J}_P+\rho_b) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{4909}$$

$$\mathbf{J}_P+\rho_b = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{4910}$$

$$\frac{\mathbf{J}_P+\rho_b}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{4911}$$

3.3.39 Derivation 76

$$\sin(\hat{X}) = r(\hat{X}) \tag{4912}$$

$$\cos(\hat{X}) = \frac{d}{d\hat{X}}r(\hat{X}) \tag{4913}$$

$$\cos(\hat{X}) = \frac{d}{d\hat{X}}\sin(\hat{X}) \tag{4914}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{4915}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{4916}$$

$$-\sin(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{4917}$$

3.3.40 Derivation 78

$$\cos\left(L_\varepsilon\right) = \dot{z}(L_\varepsilon) \tag{4918}$$

$$\int\cos\left(L_\varepsilon\right)dL_\varepsilon = \int\dot{z}(L_\varepsilon)dL_\varepsilon \tag{4919}$$

$$\int\cos\left(L_\varepsilon\right)dL_\varepsilon+1 = \int\dot{z}(L_\varepsilon)dL_\varepsilon+1 \tag{4920}$$

$$\pi+\sin\left(L_\varepsilon\right)+1 = \int\dot{z}(L_\varepsilon)dL_\varepsilon+1 \tag{4921}$$

$$\pi+\sin\left(L_\varepsilon\right)+1 = \int\dot{z}(L_\varepsilon)dL_\varepsilon+1 \tag{4922}$$

$$(\pi+\sin\left(L_\varepsilon\right)+1)^{\pi} = (\int\dot{z}(L_\varepsilon)dL_\varepsilon+1)^{\pi} \tag{4923}$$

$$(\pi+\sin\left(L_\varepsilon\right)+1)^{\pi} = (r_0+\sin\left(L_\varepsilon\right)+1)^{\pi} \tag{4924}$$

3.3.41 Derivation 79

$$\sin\left(\varepsilon_0\right) = \mathrm{f}'\left(\varepsilon_0\right) \tag{4925}$$

$$\frac{d}{d\varepsilon_0}\sin\left(\varepsilon_0\right) = \frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right) \tag{4926}$$

$$\cos\left(\varepsilon_0\right)+\frac{d}{d\varepsilon_0}\sin\left(\varepsilon_0\right) = \cos\left(\varepsilon_0\right)+\frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right) \tag{4927}$$

$$\cos\left(\varepsilon_0\right)-\frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right) = 0 \tag{4928}$$

$$\int(\cos\left(\varepsilon_0\right)-\frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right))d\varepsilon_0 = \int 0 d\varepsilon_0 \tag{4929}$$

3.3.42 Derivation 80

$$\frac{\mathbf{M}}{Q} = S(Q, \mathbf{M}) \tag{4930}$$

$$\frac{\mathbf{M}}{Q^2} = \frac{\mathbf{M}}{Q} S(Q, \mathbf{M}) \tag{4931}$$

$$\frac{\partial}{\partial Q} \frac{\mathbf{M}}{Q^2} = \frac{\partial}{\partial Q} \frac{\mathbf{M}}{Q} S(Q, \mathbf{M}) \tag{4932}$$

$$-\frac{\mathbf{M}}{Q^2} = \frac{\partial}{\partial Q} S(Q, \mathbf{M}) \tag{4933}$$

$$\frac{\partial}{\partial Q} \frac{\mathbf{M}}{Q} = \frac{\partial}{\partial Q} S(Q, \mathbf{M}) \tag{4934}$$

$$\int \frac{\partial}{\partial Q} \frac{\mathbf{M}}{Q} d\mathbf{M} = \int \frac{\partial}{\partial Q} S(Q, \mathbf{M}) d\mathbf{M} \tag{4935}$$

$$\int \frac{\partial}{\partial Q} \frac{\mathbf{M}}{Q} d\mathbf{M} - \int \frac{\partial}{\partial Q} S(Q, \mathbf{M}) d\mathbf{M} = 0 \tag{4936}$$

3.3.43 Derivation 81

$$int \sin{(\hat{H}_l)} d\hat{H}_l = \mathbf{F}(\hat{H}_l) \tag{4937}$$

$$\int \sin{(\hat{H}_l)} d\hat{H}_l = \mathbf{F}(\hat{H}_l) \tag{4938}$$

$$V - \cos{(\hat{H}_l)} = \mathbf{F}(\hat{H}_l) \tag{4939}$$

$$V - \cos{(\hat{H}_l)} = \mathbf{F}(\hat{H}_l) \tag{4940}$$

$$\int \sin{(\hat{H}_l)} d\hat{H}_l = -\cos{(\hat{H}_l)} \tag{4941}$$

$$-V + \cos{(\hat{H}_l)} = -\mathbf{F}(\hat{H}_l) \tag{4942}$$

$$(-V + \cos{(\hat{H}_l)})^C = (-\mathbf{F}(\hat{H}_l))^C \tag{4943}$$

3.3.44 Derivation 83

$$y(W, q, B) = W + \frac{q}{B} \tag{4944}$$

$$y(W, q, B) - \frac{1}{B} = 0 \tag{4945}$$

$$\frac{\partial}{\partial q}(y(W, q, B) - \frac{1}{B}) = \frac{d}{dq} 0 \tag{4946}$$

$$-\frac{\partial}{\partial q} y(W, q, B) + \frac{1}{B} = 0 \tag{4947}$$

$$-\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} = 0 \tag{4948}$$

3.3.45 Derivation 84

$$inte^Z dZ = \mathbf{S}(Z) \tag{4949}$$

$$\int e^Z dZ = \int e^Z dZ \tag{4950}$$

$$\hat{H}_\lambda + e^Z = \mathbf{S}(Z) \tag{4951}$$

$$\hat{H}_\lambda + e^Z = \int e^Z dZ \tag{4952}$$

$$\hat{H}_\lambda + e^Z = \mathbf{S}(Z) \tag{4953}$$

$$\int e^Z dZ = \hat{H}_\lambda + e^Z \tag{4954}$$

$$(\int e^Z dZ)^Z = (\hat{H}_\lambda + e^Z)^Z \tag{4955}$$

$$(\phi + e^Z)e^Z = (\hat{H}_\lambda + e^Z)e^Z \tag{4956}$$

$$(e^Z \int e^Z dZ)^\phi = ((\phi + e^Z)e^Z)^\phi \tag{4957}$$

$$e^{(e^Z \int e^Z dZ)^\phi} = e^{((\phi + e^Z)e^Z)^\phi} \tag{4958}$$

3.3.46 Derivation 85

$$e^\varepsilon = \mathrm{A_x}(\varepsilon) \tag{4959}$$

$$e^\varepsilon = \frac{d}{d\varepsilon} \mathrm{A_x}(\varepsilon) \tag{4960}$$

$$\frac{d}{d\varepsilon} \mathrm{A_x}(\varepsilon) = \frac{d^2}{d\varepsilon^2} \mathrm{A_x}(\varepsilon) \tag{4961}$$

$$\varepsilon + \frac{d}{d\varepsilon} \mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2} \mathrm{A_x}(\varepsilon) \tag{4962}$$

$$\varepsilon + e^\varepsilon = \varepsilon + \frac{d}{d\varepsilon} \mathrm{A_x}(\varepsilon) \tag{4963}$$

$$\varepsilon + \frac{d^2}{d\varepsilon^2} \mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon} \mathrm{A_x}(\varepsilon) \tag{4964}$$

3.3.47 Derivation 87

$$int(\eta + g)dg = \mathrm{r}_0(\eta, g) \tag{4965}$$

$$\int (\eta + g)dg = \int (\eta + g)dg \tag{4966}$$

$$\mathrm{r}_0(\eta, g) + \int (\eta + g)dg = \mathrm{r}_0(\eta, g) + \int (\eta + g)dg \tag{4967}$$

$$\eta g + \sigma_p + \frac{g^2}{2} = \eta g + \sigma_p + \frac{g^2}{2} \tag{4968}$$

$$2\eta g + 2\sigma_p + g^2 = \eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g)dg \tag{4969}$$

3.3.48 Derivation 93

$$int(-C_2 + \hat{p})dC_2 = \mathbf{M}(C_2, \hat{p}) \tag{4970}$$

$$\int (-C_2 + \hat{p})dC_2 = \int \mathbf{M}(C_2, \hat{p})dC_2 \tag{4971}$$

$$(\int (-C_2 + \hat{p})dC_2)^{C_2} = (\int \mathbf{M}(C_2, \hat{p})dC_2)^{C_2} \tag{4972}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} = \mathbf{M}^{C_2}(C_2, \hat{p}) \tag{4973}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} \tag{4974}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} = \mathbf{M}^{C_2}(C_2, \hat{p}) \tag{4975}$$

3.3.49 Derivation 96

$$\frac{h}{\mathbf{s}} = \psi(\mathbf{s}, h) \tag{4976}$$

$$\frac{\mathbf{s}}{h} = 1 \tag{4977}$$

$$\frac{\mathbf{s}}{h} = \frac{\psi(\mathbf{s}, h)}{\mathbf{s}} \tag{4978}$$

$$1 = \frac{\partial}{\partial h}\frac{\psi(\mathbf{s}, h)}{\mathbf{s}} \tag{4979}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{4980}$$

3.3.50 Derivation 98

$$\log(\delta) = \Psi(\delta) \tag{4981}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\Psi(\delta) \tag{4982}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\log(\delta) \tag{4983}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\Psi(\delta) \tag{4984}$$

$$\frac{d}{d\delta}\log(\delta) = \frac{d}{d\delta}\log(\delta) \tag{4985}$$

$$(\frac{d}{d\delta}\log(\delta))^{-\delta} = (\frac{d}{d\delta}\log(\delta))^{-\delta}\frac{d}{d\delta}\log(\delta) \tag{4986}$$

$$\frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} = (\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log(\delta) \tag{4987}$$

3.4 Perturbation: AG

3.4.1 Derivation 1

$$\mathrm{J}_\varepsilon(\mathbf{s}) = \frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \tag{4988}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_\varepsilon(\mathbf{s}) = \frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) \tag{4989}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_\varepsilon(\mathbf{s}) = -\sin(\mathbf{s}) \tag{4990}$$

$$\mathbf{s} + \frac{d}{d\mathbf{s}}\mathrm{J}_\varepsilon(\mathbf{s}) = \mathbf{s} - \sin(\mathbf{s}) \tag{4991}$$

3.4.2 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{4992}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{4993}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{4994}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{4995}$$

3.4.3 Derivation 4

$$\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \sin\left(P_e\right) \tag{4996}$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \frac{d}{dP_e}\sin\left(P_e\right) \tag{4997}$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}\left(P_e\right) = \cos\left(P_e\right) \tag{4998}$$

$$\frac{d}{dP_e}\sin\left(P_e\right) = \cos\left(P_e\right) \tag{4999}$$

$$\frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = \frac{\cos\left(P_e\right)}{P_e} \tag{5000}$$

$$\frac{\frac{d}{dP_e}\sin\left(P_e\right)}{P_e} = \frac{\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}\left(P_e\right)}{P_e} \tag{5001}$$

3.4.4 Derivation 6

$$\mathbf{M}(J) = \cos\left(J\right) \tag{5002}$$

$$\int \mathbf{M}(J)dJ = \int \cos\left(J\right)dJ \tag{5003}$$

$$(\int \mathbf{M}(J)dJ)^{F_g} = (\int \cos\left(J\right)dJ)^{F_g} \tag{5004}$$

$$\int \mathbf{M}(J)dJ = F_g + \sin\left(J\right) \tag{5005}$$

$$2(\int \mathbf{M}(J)dJ)^{F_g} = (F_g+\sin\left(J\right))^{F_g}+(\int \mathbf{M}(J)dJ)^{F_g} \tag{5006}$$

$$\frac{2(\int \mathbf{M}(J)dJ)^{F_g}}{F_g} = \frac{(F_g+\sin\left(J\right))^{F_g}+(\int \cos\left(J\right)dJ)^{F_g}}{F_g} \tag{5007}$$

$$\frac{2(F_g+\sin\left(J\right))^{F_g}}{F_g} = \frac{(F_g+\sin\left(J\right))^{F_g}+(\int \cos\left(J\right)dJ)^{F_g}}{F_g} \tag{5008}$$

3.4.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{5009}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{5010}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{5011}$$

$$\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{5012}$$

3.4.6 Derivation 9

$$\hat{p}_0(\phi,\mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H}+\phi) \tag{5013}$$

$$\hat{p}_0(\phi,\mathbf{H}) = 1 \tag{5014}$$

$$\frac{\partial}{\partial\phi}\hat{p}_0(\phi,\mathbf{H}) = \frac{d}{d\phi}1 \tag{5015}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) = \frac{d}{d\phi}1 \tag{5016}$$

$$0 = \frac{\partial}{\partial\phi}\hat{p}_0(\phi,\mathbf{H}) \tag{5017}$$

$$0 = \frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi) \tag{5018}$$

$$0^{\mathbf{H}} = (\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi))^{\mathbf{H}} \tag{5019}$$

3.4.7 Derivation 10

$$\theta(q) = \cos\left(q\right) \tag{5020}$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos\left(q\right) \tag{5021}$$

$$\frac{d}{dq}\theta(q) = -\sin\left(q\right) \tag{5022}$$

$$-\sin\left(q\right) = \frac{d}{dq}\cos\left(q\right) \tag{5023}$$

$$(-\sin\left(q\right))^q = (\frac{d}{dq}\cos\left(q\right))^q \tag{5024}$$

$$\frac{d}{dq}(-\sin\left(q\right))^q = \frac{d}{dq}(\frac{d}{dq}\cos\left(q\right))^q \tag{5025}$$

3.4.8 Derivation 13

$$\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) = \frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \tag{5026}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) = \mathbf{P}\frac{\partial}{\partial\mathbf{P}}Q\mathbf{P} \tag{5027}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) = Q\mathbf{P} \tag{5028}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)-\cos\left(\sin\left(J\right)\right) = Q\mathbf{P}-\cos\left(\sin\left(J\right)\right) \tag{5029}$$

$$\int(\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right)-\cos\left(\sin\left(J\right)\right))dQ = \int(Q\mathbf{P}-\cos\left(\sin\left(J\right)\right))dQ \tag{5030}$$

3.4.9 Derivation 14

$$\mathrm{a}^{\dagger}(u) = \cos(u) \tag{5031}$$

$$\frac{d}{du}\mathrm{a}^{\dagger}(u) = \frac{d}{du}\cos(u) \tag{5032}$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^{u} = (\frac{d}{du}\cos(u))^{u} \tag{5033}$$

$$(\frac{d}{du}\mathrm{a}^{\dagger}(u))^{u} = (-\sin(u))^{u} \tag{5034}$$

$$(\frac{d}{du}\cos(u))^{u} = (-\sin(u))^{u} \tag{5035}$$

$$-\sin(u) + (\frac{d}{du}\cos(u))^{u} = (-\sin(u))^{u} - \sin(u) \tag{5036}$$

3.4.10 Derivation 16

$$f(C_d) = C_d \tag{5037}$$

$$\frac{d}{dC_d}f(C_d) = \frac{d}{dC_d}C_d \tag{5038}$$

$$\frac{d}{dC_d}f(C_d) = 1 \tag{5039}$$

$$\frac{d}{dC_d}C_d = 1 \tag{5040}$$

$$1 = \frac{1}{\frac{d}{dC_d}C_d} \tag{5041}$$

$$2 = 1 + \frac{1}{\frac{d}{dC_d}C_d} \tag{5042}$$

3.4.11 Derivation 17

$$\hat{X}(f') = \cos(f') \tag{5043}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos(f') \tag{5044}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos(f') \tag{5045}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos(f') \tag{5046}$$

$$\frac{d^2}{d(f')^2}\cos(f') = -\cos(f') \tag{5047}$$

3.4.12 Derivation 19

$$\mathrm{E}_{\lambda}(\hat{H}_l) = \int e^{\hat{H}_l} d\hat{H}_l \tag{5048}$$

$$0 = -\mathrm{E}_{\lambda}(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l \tag{5049}$$

$$0 = (-\mathrm{E}_{\lambda}(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{5050}$$

$$0 = (A_y + e^{\hat{H}_l})(-\mathrm{E}_{\lambda}(\hat{H}_l) + \int e^{\hat{H}_l} d\hat{H}_l)^2 \tag{5051}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_{\lambda}(\hat{H}_l) + e^{\hat{H}_l})^2 \tag{5052}$$

$$0 = (A_y + e^{\hat{H}_l})^2(A_y - \mathrm{E}_{\lambda}(\hat{H}_l) + e^{\hat{H}_l})^4 \tag{5053}$$

3.4.13 Derivation 20

$$\mathrm{n}_2(V_{\mathbf{B}}, \mu_0) = \cos(V_{\mathbf{B}} + \mu_0) \tag{5054}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = \int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 \tag{5055}$$

$$\int \mathrm{n}_2(V_{\mathbf{B}}, \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{5056}$$

$$\int \cos(V_{\mathbf{B}} + \mu_0) d\mu_0 = C_2 + \sin(V_{\mathbf{B}} + \mu_0) \tag{5057}$$

3.4.14 Derivation 23

$$\mathbf{p}(\phi) = \cos(e^{\phi}) \tag{5058}$$

$$\int \mathbf{p}(\phi) d\phi = \int \cos(e^{\phi}) d\phi \tag{5059}$$

$$\int \mathbf{p}(\phi) d\phi = \omega + \mathrm{Ci}(e^{\phi}) \tag{5060}$$

$$\int \cos(e^{\phi}) d\phi = \omega + \mathrm{Ci}(e^{\phi}) \tag{5061}$$

$$\int \mathbf{p}(\phi) d\phi = \mathrm{Ci}(e^{\phi}) \tag{5062}$$

3.4.15 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{5063}$$

$$\int y(A_x)dA_x = \int \frac{1}{A_x}dA_x \tag{5064}$$

$$\int y(A_x)dA_x = \varepsilon_0 + \log{(A_x)} \tag{5065}$$

$$\int \frac{1}{A_x}dA_x = \varepsilon_0 + \log{(A_x)} \tag{5066}$$

$$\int \frac{1}{A_x}dA_x - \frac{x}{A_x} = \varepsilon_0 + \log{(A_x)} - \frac{x}{A_x} \tag{5067}$$

$$\frac{\partial}{\partial \varepsilon_0}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial \varepsilon_0}(\varepsilon_0 + \log{(A_x)} - \frac{x}{A_x}) \tag{5068}$$

3.4.16 Derivation 25

$$\theta_1(g) = e^g \tag{5069}$$

$$\int \theta_1(g)dg = \int e^g dg \tag{5070}$$

$$(\int \theta_1(g)dg)^g = (\int e^g dg)^g \tag{5071}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{d}{dg}(\int e^g dg)^g \tag{5072}$$

$$\frac{d}{dg}(\int \theta_1(g)dg)^g = \frac{\partial}{\partial g}(\mathbf{g} + e^g)^g \tag{5073}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + e^g)^g = \frac{\partial}{\partial g}(L + e^g)^g \tag{5074}$$

3.4.17 Derivation 29

$$q(c_0) = e^{c_0} \tag{5075}$$

$$\int q(c_0)dc_0 = \int e^{c_0}dc_0 \tag{5076}$$

$$e^{-c_0}\int q(c_0)dc_0 = e^{-c_0}\int e^{c_0}dc_0 \tag{5077}$$

$$e^{-c_0}\int q(c_0)dc_0 = (n + e^{c_0})e^{-c_0} \tag{5078}$$

$$\frac{(n + e^{c_0})e^{-c_0}}{\int q(c_0)dc_0} = \frac{(n + e^{c_0})e^{-c_0}}{\int q(c_0)dc_0} \tag{5079}$$

3.4.18 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{5080}$$

$$b^{A_x}(A_x, i) = (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} \tag{5081}$$

$$-b^{A_x}(A_x, i) + (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} = 0 \tag{5082}$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \tag{5083}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{5084}$$

$$\frac{-(-1)^{A_x} + (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x}}{i} = 0 \tag{5085}$$

3.4.19 Derivation 32

$$\mathrm{P_e}\,(\dot{z}) = \sin{(\dot{z})} \tag{5086}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \frac{d}{d\dot{z}}\sin{(\dot{z})} \tag{5087}$$

$$\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \cos{(\dot{z})} \tag{5088}$$

$$\sin{(\dot{z})}\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z}) = \sin{(\dot{z})}\cos{(\dot{z})} \tag{5089}$$

$$\frac{\sin{(\dot{z})}\frac{d}{d\dot{z}}\,\mathrm{P_e}\,(\dot{z})}{\mathrm{P_e}\,(\dot{z})} = \frac{\sin{(\dot{z})}\cos{(\dot{z})}}{\mathrm{P_e}\,(\dot{z})} \tag{5090}$$

3.4.20 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{5091}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{5092}$$

$$\frac{\partial}{\partial \mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\varepsilon}{v_1} \tag{5093}$$

$$\frac{\partial}{\partial \mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} = \frac{\varepsilon}{v_1} \tag{5094}$$

3.4.21 Derivation 36

$$\mathrm{f}'(\dot{z}, V, A) = A + V - \dot{z} \tag{5095}$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \int (A + V - \dot{z}) dV \tag{5096}$$

$$\int \mathrm{f}'(\dot{z}, V, A) dV = \frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A} \tag{5097}$$

$$\iint \mathrm{f}'(\dot{z}, V, A) dV dV = \int (\frac{V^2}{2} + V(A - \dot{z}) + \mathbf{A}) dV \tag{5098}$$

3.4.22 Derivation 39

$$(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{5099}$$

$$\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0) d\mathbf{A} \tag{5100}$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \tag{5101}$$

$$(\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{5102}$$

$$(\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{5103}$$

3.4.23 Derivation 40

$$\hat{p}(k, \hat{H}_\lambda) = \frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} \tag{5104}$$

$$\hat{p}(k, \hat{H}_\lambda) = \frac{1}{k} \tag{5105}$$

$$\frac{\partial}{\partial \hat{H}_\lambda} \frac{\hat{H}_\lambda}{k} = \frac{1}{k} \tag{5106}$$

3.4.24 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{5107}$$

$$\int \mathrm{F_x}(\pi) d\pi = \int e^{e^{\pi}} d\pi \tag{5108}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^{\pi}) \tag{5109}$$

$$\int \mathrm{F_x}(\pi) d\pi = P_g + \mathrm{Ei}(e^{\pi}) \tag{5110}$$

$$0 = P_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi) d\pi \tag{5111}$$

$$0 = F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi) d\pi \tag{5112}$$

$$\int 0 d\pi = \int (F_g + \mathrm{Ei}(e^{\pi}) - \int \mathrm{F_x}(\pi) d\pi) d\pi \tag{5113}$$

3.4.25 Derivation 43

$$(\nabla) = \cos(\nabla) \tag{5114}$$

$$G(\nabla) + \sin(\nabla) = 2\cos(\nabla) \tag{5115}$$

$$\frac{d}{d\nabla}(G(\nabla) + \sin(\nabla)) = \frac{d}{d\nabla} 2\cos(\nabla) \tag{5116}$$

$$\int \frac{d}{d\nabla}(G(\nabla) + \sin(\nabla)) d\nabla = \int \frac{d}{d\nabla} 2\cos(\nabla)) d\nabla \tag{5117}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{5118}$$

$$\frac{\int(\varphi + G(\nabla) + \sin(\nabla)) d\nabla}{\varphi + G(\nabla) + \sin(\nabla)} = \frac{\int(\varphi + \sin(\nabla) + \cos(\nabla)) d\nabla}{\varphi + G(\nabla) + \sin(\nabla)} \tag{5119}$$

3.4.26 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{5120}$$

$$f^* \nabla(f^*, \pi) = f^* \frac{\partial}{\partial f^*}(\pi + f^*) \tag{5121}$$

$$f^* \nabla(f^*, \pi) = f^* \tag{5122}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) = f^* \tag{5123}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) = f^* \tag{5124}$$

$$f^* \frac{\partial}{\partial f^*}(\pi + f^*) + (f^* \frac{\partial}{\partial f^*}(\pi + f^*))^{f^*} = f^* \frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} \tag{5125}$$

3.4.27 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{5126}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{5127}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = -\frac{F_x}{\mathbf{r}^2} \tag{5128}$$

$$\frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}} \tag{5129}$$

$$-\frac{F_x}{\mathbf{r}} + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -\frac{F_x}{\mathbf{r}} - \frac{F_x}{\mathbf{r}^2} \tag{5130}$$

3.4.28 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{5131}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{5132}$$

$$\int u(\lambda)d\lambda = n - \cos(\lambda) \tag{5133}$$

$$\int \sin(\lambda)d\lambda = n - \cos(\lambda) \tag{5134}$$

$$\iint \sin(\lambda)d\lambda dn = \int (n - \cos(\lambda))dn \tag{5135}$$

3.4.29 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{5136}$$

$$\phi_1 \mathrm{f}'(\phi_1) = \phi_1^2 \tag{5137}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \int \phi_1^2 d\phi_1 \tag{5138}$$

$$\int \phi_1 \mathrm{f}'(\phi_1)d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{5139}$$

$$\int \phi_1^2 d\phi_1 = \hbar + \frac{\phi_1^3}{3} \tag{5140}$$

$$\dot{y} + \frac{\phi_1^3}{3} = \hbar + \frac{\phi_1^3}{3} \tag{5141}$$

3.4.30 Derivation 48

$$\mathrm{a}^\dagger(\omega) = \int \log(\omega)d\omega \tag{5142}$$

$$\mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega + \rho \tag{5143}$$

$$-\rho + \mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega \tag{5144}$$

$$(-\rho + \mathrm{a}^\dagger(\omega))^\omega = (\omega\log(\omega) - \omega)^\omega \tag{5145}$$

$$(-\rho+\mathrm{a}^\dagger(\omega))^\omega-\mathrm{a}^\dagger(\omega) = (\omega\log(\omega)-\omega)^\omega-\mathrm{a}^\dagger(\omega) \tag{5146}$$

$$\rho+(-\rho+\mathrm{a}^\dagger(\omega))^\omega-\mathrm{a}^\dagger(\omega) = \rho+(\omega\log(\omega)-\omega)^\omega-\mathrm{a}^\dagger(\omega) \tag{5147}$$

3.4.31 Derivation 49

$$\hat{x}(f) = \int \log(f)df \tag{5148}$$

$$\hat{x}^2(f) = \hat{x}(f)\int \log(f)df \tag{5149}$$

$$\hat{x}^2(f) = (B+f\log(f)-f)\int \log(f)df \tag{5150}$$

$$(B+f\log(f)-f)^2 = (B+f\log(f)-f)\int \log(f)df \tag{5151}$$

3.4.32 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{5152}$$

$$\int \mathbf{v}(C_2)dC_2 = \int C_2 dC_2 \tag{5153}$$

$$\int \mathbf{v}(C_2)dC_2 = \frac{C_2^2}{2} + v \tag{5154}$$

$$\int C_2 dC_2 = \frac{C_2^2}{2} + v \tag{5155}$$

$$\mathbf{p} + \frac{C_2^2}{2} + v = \int C_2 dC_2 \tag{5156}$$

$$\mathbf{p} + v + \mathbf{v}^2(C_2) = v + \frac{\mathbf{v}^2(C_2)}{2} \tag{5157}$$

$$\mathbf{p} + v + \mathbf{v}^2(C_2) = 2v + \mathbf{v}^2(C_2) \tag{5158}$$

3.4.33 Derivation 54

$$(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{5159}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{5160}$$

$$\frac{\partial}{\partial \mathbf{P}} \frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}^2} \tag{5161}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{5162}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{5163}$$

3.4.34 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{5164}$$

$$\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*} \log(\psi^*) \tag{5165}$$

$$\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*) = \frac{1}{\psi^*} \tag{5166}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*} \log(\psi^*) \tag{5167}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*} \tag{5168}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*} \log(\psi^*))^{\psi^*})^{\psi^*} \tag{5169}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*} \mathrm{M_E}(\psi^*))^{\psi^*})^{\psi^*} \tag{5170}$$

3.4.35 Derivation 64

$$\delta(q) = \log(q) \tag{5171}$$

$$\int \delta(q) dq = \int \log(q) dq \tag{5172}$$

$$0 = -\int \delta(q) dq + \int \log(q) dq \tag{5173}$$

$$0 = A_2 + q\log(q) - q - \int \delta(q) dq \tag{5174}$$

$$0 = A_2 + q\delta(q) - q\log(q) \tag{5175}$$

$$0 = A_2 - m_s + q\delta(q) - q\log(q) \tag{5176}$$

$$0^q = (A_2 - m_s + q\delta(q) - q\log(q))^q \tag{5177}$$

3.4.36 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{5178}$$

$$\frac{\partial}{\partial G} \mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{5179}$$

$$\frac{\partial}{\partial G} \mathrm{v_x}(G, L) = 1 \tag{5180}$$

$$(\frac{\partial}{\partial G} \mathrm{v_x}(G, L))^G = 1 \tag{5181}$$

$$((\frac{\partial}{\partial G} \mathrm{v_x}(G, L))^G)^G = 1 \tag{5182}$$

$$((\frac{\partial}{\partial G} \mathrm{v_x}(G, L))^G)^G + \frac{\partial}{\partial G} \mathrm{v_x}(G, L) = \frac{\partial}{\partial G} \mathrm{v_x}(G, L) + 1 \tag{5183}$$

3.4.37 Derivation 72

$$\mathrm{A_1}(\theta_1) = \cos(\theta_1) \tag{5184}$$

$$\mathrm{A_1}(\theta_1)\cos(\theta_1) = \cos^2(\theta_1) \tag{5185}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1) d\theta_1 = \int \cos^2(\theta_1) d\theta_1 \tag{5186}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1) d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\sin(\theta_1)\cos(\theta_1)}{2} \tag{5187}$$

$$\int \mathrm{A_1}(\theta_1)\cos(\theta_1) d\theta_1 = \frac{\theta_1}{2} + t_2 + \frac{\mathrm{A_1}(\theta_1)\sin(\theta_1)}{2} \tag{5188}$$

3.4.38 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{5189}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{5190}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{5191}$$

$$\int \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)ds = \int (\mathbf{J}_P + \rho_b)ds \tag{5192}$$

3.4.39 Derivation 76

$$r(\hat{X}) = \sin(\hat{X}) \tag{5193}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin(\hat{X}) \tag{5194}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos(\hat{X}) \tag{5195}$$

$$\frac{d}{d\hat{X}}\sin(\hat{X}) = \cos(\hat{X}) \tag{5196}$$

$$\frac{d^2}{d\hat{X}^2}\sin(\hat{X}) = \frac{d}{d\hat{X}}\cos(\hat{X}) \tag{5197}$$

3.4.40 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{5198}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon = \int \cos(L_\varepsilon)dL_\varepsilon \tag{5199}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + 1 \tag{5200}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5201}$$

$$\int \cos(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5202}$$

$$(\int \cos(L_\varepsilon)dL_\varepsilon + 1)^\pi = (\pi + \sin(L_\varepsilon) + 1)^\pi \tag{5203}$$

$$(g_\varepsilon + \sin(L_\varepsilon) + 1)^\pi = (\pi + \sin(L_\varepsilon) + 1)^\pi \tag{5204}$$

3.4.41 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{5205}$$

$$0 = -\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0) \tag{5206}$$

$$\frac{d}{d\varepsilon_0}0 = \frac{d}{d\varepsilon_0}(-\mathrm{f}'(\varepsilon_0) + \sin(\varepsilon_0)) \tag{5207}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{5208}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\sin(\varepsilon_0) \tag{5209}$$

3.4.42 Derivation 80

$$(Q, \mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{5210}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{5211}$$

$$\frac{\partial}{\partial Q}S(Q, \mathbf{M}) = -\frac{\mathbf{M}}{Q^2} \tag{5212}$$

$$\frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} = -\frac{\mathbf{M}}{Q^2} \tag{5213}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int -\frac{\mathbf{M}}{Q^2}d\mathbf{M} \tag{5214}$$

$$\int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} = \int \frac{\partial}{\partial Q}S(Q, \mathbf{M})d\mathbf{M} \tag{5215}$$

3.4.43 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l)d\hat{H}_l \tag{5216}$$

$$\mathbf{F}(\hat{H}_l) = V - \cos(\hat{H}_l) \tag{5217}$$

$$-\mathbf{F}(\hat{H}_l) = -V + \cos(\hat{H}_l) \tag{5218}$$

$$-\mathbf{F}(\hat{H}_l) = -C + \cos(\hat{H}_l) \tag{5219}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-C + \cos(\hat{H}_l))^C \tag{5220}$$

$$(-\int \sin(\hat{H}_l)d\hat{H}_l)^C = (-C + \cos(\hat{H}_l))^C \tag{5221}$$

3.4.44 Derivation 83

$$y(W,q,B) = W + \frac{q}{B} \tag{5222}$$

$$0 = W - y(W,q,B) + \frac{q}{B} \tag{5223}$$

$$\frac{d}{dq}0 = \frac{\partial}{\partial q}(W - y(W,q,B) + \frac{q}{B}) \tag{5224}$$

$$0 = -\frac{\partial}{\partial q}y(W,q,B) + \frac{1}{B} \tag{5225}$$

$$0 = -\frac{\partial}{\partial q}y(W,q,B) + \frac{1}{B} \tag{5226}$$

$$W + \frac{q}{B} = W - \frac{\partial}{\partial q}y(W,q,B) + \frac{q}{B} + \frac{1}{B} \tag{5227}$$

3.4.45 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{5228}$$

$$\mathbf{S}(Z)e^Z = e^Z \int e^Z dZ \tag{5229}$$

$$e^Z\mathbf{S}(Z) = e^Z(\int e^Z dZ) \tag{5230}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{5231}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{5232}$$

$$((\hat{H}_\lambda + e^Z)e^Z)^\phi = ((\phi + e^Z)e^Z)^\phi \tag{5233}$$

$$((\phi + e^Z)e^Z)^\phi = (\mathbf{S}(Z)e^Z)^\phi \tag{5234}$$

3.4.46 Derivation 85

$$\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{5235}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \frac{d}{d\varepsilon}e^\varepsilon \tag{5236}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{5237}$$

$$\frac{d}{d\varepsilon}e^\varepsilon = e^\varepsilon \tag{5238}$$

$$\frac{d}{d\varepsilon}e^\varepsilon = \mathrm{A_x}(\varepsilon) \tag{5239}$$

3.4.47 Derivation 87

$$\mathrm{r}_0(\eta,g) = \int (\eta + g)dg \tag{5240}$$

$$\mathrm{r}_0(\eta,g) = \eta g + \sigma_p + \frac{g^2}{2} \tag{5241}$$

$$\int (\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} \tag{5242}$$

$$2\int (\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g)dg \tag{5243}$$

3.4.48 Derivation 93

$$\mathbf{M}(C_2,\hat{p}) = \int (-C_2 + \hat{p})dC_2 \tag{5244}$$

$$\mathbf{M}^{C_2}(C_2,\hat{p}) = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{5245}$$

$$\mathbf{M}^{C_2}(C_2,\hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} \tag{5246}$$

$$(\int (-C_2 + \hat{p})dC_2)^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{5247}$$

$$(-\frac{C_2^2}{2} + C_2\hat{p} + a^\dagger)^{C_2} = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{5248}$$

3.4.49 Derivation 96

$$\psi(\mathbf{s},h) = \frac{h}{\mathbf{s}} \tag{5249}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s},h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{5250}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s},h) = \frac{1}{\mathbf{s}} \tag{5251}$$

$$\frac{\partial}{\partial h}\frac{h}{\mathbf{s}} = \frac{1}{\mathbf{s}} \tag{5252}$$

$$\frac{\frac{\partial}{\partial h}\frac{h}{\mathbf{s}}}{\mathbf{s}} = \frac{1}{\mathbf{s}^2} \tag{5253}$$

3.4.50 Derivation 98

$$\Psi(\delta) = \log(\delta) \tag{5254}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log(\delta) \tag{5255}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5256}$$

$$\log(\delta)\frac{d}{d\delta}\Psi(\delta) = \frac{\log(\delta)}{\delta} \tag{5257}$$

$$\log(\delta)\frac{d}{d\delta}\log(\delta) = \frac{\log(\delta)}{\delta} \tag{5258}$$

3.5 Perturbation: SR

3.5.1 Derivation 1

$$\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \tag{5259}$$

$$\mathrm{J}_{\varepsilon}(\mathbf{s}) - \frac{d}{d\mathbf{s}}\sin(\mathbf{s}) = 0 \tag{5260}$$

$$\frac{d}{d\mathbf{s}}(\mathrm{J}_{\varepsilon}(\mathbf{s}) - \frac{d}{d\mathbf{s}}\sin(\mathbf{s})) = \frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) \tag{5261}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) = -\sin(\mathbf{s}) \tag{5262}$$

3.5.2 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{5263}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{5264}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{5265}$$

$$\hat{x}_0\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{5266}$$

3.5.3 Derivation 4

$$\mathrm{V}_{\mathbf{B}}(P_e) = \sin(P_e) \tag{5267}$$

$$\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e) = \frac{d}{dP_e}\sin(P_e) \tag{5268}$$

$$\frac{\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e)}{P_e} = \frac{\frac{d}{dP_e}\sin(P_e)}{P_e} \tag{5269}$$

$$\frac{\frac{d}{dP_e}\mathrm{V}_{\mathbf{B}}(P_e)}{P_e} = \frac{\cos(P_e)}{P_e} \tag{5270}$$

$$-1 + \frac{\frac{d}{dP_e}\sin(P_e)}{P_e} = -1 + \frac{\cos(P_e)}{P_e} \tag{5271}$$

3.5.4 Derivation 6

$$\mathbf{M}(J) = \cos(J) \tag{5272}$$

$$\int\mathbf{M}(J)dJ = \int\cos(J)dJ \tag{5273}$$

$$(\int\mathbf{M}(J)dJ)^{F_g} = (\int\cos(J)dJ)^{F_g} \tag{5274}$$

$$2(\int\mathbf{M}(J)dJ)^{F_g} = (\int\mathbf{M}(J)dJ)^{F_g} + (\int\cos(J)dJ)^{F_g} \tag{5275}$$

$$2(F_g + \sin(J))^{F_g} = (F_g + \sin(J))^{F_g} + (\int\cos(J)dJ)^{F_g} \tag{5276}$$

$$\int 2(F_g + \sin(J))^{F_g}dF_g = \int((F_g + \sin(J))^{F_g} + (\int\cos(J)dJ)^{F_g} \tag{5277}$$

3.5.5 Derivation 7

$$\mathrm{C_d}(\mathbf{p}) = \sin(\mathbf{p}) \tag{5278}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = \frac{d}{d\mathbf{p}}\sin(\mathbf{p}) \tag{5279}$$

$$F_c\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p}) \tag{5280}$$

$$\int F_c\cos(\mathbf{p})dF_c = \int F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c \tag{5281}$$

3.5.6 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) \tag{5282}$$

$$\hat{p}_0(\phi, \mathbf{H}) + 1 = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) + 1 \tag{5283}$$

$$2\hat{p}_0(\phi, \mathbf{H}) + 1 = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) + 1 \tag{5284}$$

$$\frac{\partial}{\partial\phi}(2\hat{p}_0(\phi, \mathbf{H}) + 1) - 1 = \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) + \frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) - 1 \tag{5285}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) - 1 = -3\frac{\partial}{\partial\phi}(-\mathbf{H} + \phi) + \frac{\partial^2}{\partial\phi^2}(-\mathbf{H} + \phi) - 1 \tag{5286}$$

3.5.7 Derivation 10

$$\theta(q) = \cos{(q)} \tag{5287}$$

$$\frac{d}{dq}\theta(q) = \frac{d}{dq}\cos{(q)} \tag{5288}$$

$$(\frac{d}{dq}\theta(q))^{q} = (\frac{d}{dq}\cos{(q)})^{q} \tag{5289}$$

$$(-\sin{(q)})^{q}(\frac{d}{dq}\theta(q))^{q} = (-\sin{(q)})^{q}(\frac{d}{dq}\cos{(q)})^{q} \tag{5290}$$

$$(-\sin{(q)})^{2q} = (-\sin{(q)})^{q}(\frac{d}{dq}\cos{(q)})^{q} \tag{5291}$$

3.5.8 Derivation 13

$$\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) = \frac{\partial}{\partial \mathbf{P}}Q\mathbf{P} \tag{5292}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) = Q\mathbf{P} \tag{5293}$$

$$\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) - \cos{(\sin{(J)})} = Q\mathbf{P} - \cos{(\sin{(J)})} \tag{5294}$$

$$\frac{\mathbf{P}\,\mathrm{V}_{\mathbf{E}}\left(Q,\mathbf{P}\right) - \cos{(\sin{(J)})}}{J} = \frac{Q\mathbf{P} - \cos{(\sin{(J)})}}{J} \tag{5295}$$

3.5.9 Derivation 14

$$\mathrm{a}^{\dagger}\left(u\right) = \cos{(u)} \tag{5296}$$

$$\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right) = \frac{d}{du}\cos{(u)} \tag{5297}$$

$$(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^{u} = (\frac{d}{du}\cos{(u)})^{u} \tag{5298}$$

$$\frac{d}{du}(\frac{d}{du}\,\mathrm{a}^{\dagger}\left(u\right))^{u} = \frac{d}{du}(\frac{d}{du}\cos{(u)})^{u} \tag{5299}$$

$$\frac{d}{du}(\frac{d}{du}\cos{(u)})^{u} = \frac{d}{du}(-\sin{(u)})^{u} \tag{5300}$$

3.5.10 Derivation 16

$$f(C_d) = C_d \tag{5301}$$

$$\frac{d}{df(C_d)}f(C_d) = \frac{d}{dC_d}C_d \tag{5302}$$

$$1 = \frac{\frac{d}{dC_d}C_d}{\frac{d}{df(C_d)}f(C_d)} \tag{5303}$$

$$1 = \frac{1}{\frac{d}{df(C_d)}f(C_d)} \tag{5304}$$

3.5.11 Derivation 17

$$\hat{X}(f') = \cos{(f')} \tag{5305}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos{(f')} \tag{5306}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos{(f')} \tag{5307}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\left(f'\right)} = -\frac{\cos{(f')}}{\mathrm{P_e}\left(f'\right)} \tag{5308}$$

3.5.12 Derivation 19

$$\mathrm{E}_{\lambda}\left(\hat{H}_l\right) = \int e^{\hat{H}_l}d\hat{H}_l \tag{5309}$$

$$0 = -\,\mathrm{E}_{\lambda}\left(\hat{H}_l\right) + \int e^{\hat{H}_l}d\hat{H}_l \tag{5310}$$

$$0 = (-\,\mathrm{E}_{\lambda}\left(\hat{H}_l\right) + \int e^{\hat{H}_l}d\hat{H}_l)^2 \tag{5311}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 \tag{5312}$$

3.5.13 Derivation 20

$$\mathrm{n}_2\left(V_{\mathbf{B}},\mu_0\right) = \cos{(V_{\mathbf{B}} + \mu_0)} \tag{5313}$$

$$\int \mathrm{n}_2\left(V_{\mathbf{B}},\mu_0\right)d\mu_0 = \int \cos{(V_{\mathbf{B}} + \mu_0)}d\mu_0 \tag{5314}$$

$$\int \cos{(V_{\mathbf{B}} + \mu_0)}d\mu_0 = C_2 + \sin{(V_{\mathbf{B}} + \mu_0)} \tag{5315}$$

3.5.14 Derivation 23

$$\mathbf{p}(\phi) = \cos\left(e^{\phi}\right) \tag{5316}$$

$$\int \mathbf{p}(\phi)d\phi = \int \cos\left(e^{\phi}\right)d\phi \tag{5317}$$

$$\iint \mathbf{p}(\phi)d\phi d\phi = \iint \cos\left(e^{\phi}\right)d\phi d\phi \tag{5318}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi)d\phi d\phi = \frac{d}{d\phi}\iint \cos\left(e^{\phi}\right)d\phi d\phi \tag{5319}$$

$$\frac{d}{d\phi}\iint \mathbf{p}(\phi)d\phi d\phi = \frac{\partial}{\partial\phi}\int(\omega + \operatorname{Ci}\left(e^{\phi}\right))d\phi \tag{5320}$$

3.5.15 Derivation 24

$$y(A_x) = \frac{1}{A_x} \tag{5321}$$

$$\int y(A_x)dA_x = \int \frac{1}{A_x}dA_x \tag{5322}$$

$$\int \frac{1}{A_x}dA_x - \frac{x}{A_x} = \int \frac{1}{A_x}dA_x - \frac{x}{A_x} \tag{5323}$$

$$\frac{\partial}{\partial x}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) \tag{5324}$$

$$\frac{\partial}{\partial x}(\int \frac{1}{A_x}dA_x - \frac{x}{A_x}) = \frac{\partial}{\partial x}(\varepsilon_0 + \log\left(A_x\right) - \frac{x}{A_x}) \tag{5325}$$

3.5.16 Derivation 25

$$\theta_1(g) = e^{g} \tag{5326}$$

$$\frac{d}{dg}\theta_1(g) = \frac{d}{dg}e^{g} \tag{5327}$$

$$\int \frac{d}{dg}\theta_1(g)dg = \int \frac{d}{dg}e^{g}dg \tag{5328}$$

$$(\int \frac{d}{dg}\theta_1(g)dg)^{g} = (\int \frac{d}{dg}e^{g}dg)^{g} \tag{5329}$$

$$\frac{\partial}{\partial g}(\mathbf{g} + \theta_1(g))^{g} = \frac{d}{dg}(\int e^{g}dg)^{g} \tag{5330}$$

3.5.17 Derivation 29

$$q(c_0) = e^{c_0} \tag{5331}$$

$$\int q(c_0)dc_0 = \int e^{c_0}dc_0 \tag{5332}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{\int e^{c_0}dc_0}{q(c_0)} \tag{5333}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + q(c_0)}{q(c_0)} \tag{5334}$$

3.5.18 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{5335}$$

$$b^{A_x}(A_x, i) = (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} \tag{5336}$$

$$-(\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} + b^{A_x}(A_x, i) = 0 \tag{5337}$$

$$\frac{-(\frac{\partial}{\partial A_x}(-A_x + i))^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{5338}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{5339}$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i}di = \int 0di \tag{5340}$$

3.5.19 Derivation 32

$$\mathrm{P_e}\left(\dot{z}\right) = \sin\left(\dot{z}\right) \tag{5341}$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \frac{d}{d\dot{z}}\sin\left(\dot{z}\right) \tag{5342}$$

$$\mathrm{P_e}\left(\dot{z}\right)\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \mathrm{P_e}\left(\dot{z}\right)\frac{d}{d\dot{z}}\sin\left(\dot{z}\right) \tag{5343}$$

$$\mathrm{P_e}\left(\dot{z}\right)\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \mathrm{P_e}\left(\dot{z}\right)\cos\left(\dot{z}\right) \tag{5344}$$

3.5.20 Derivation 34

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\mathbf{f}\varepsilon}{v_1} \tag{5345}$$

$$\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) = \frac{\partial}{\partial\mathbf{f}}\frac{\mathbf{f}\varepsilon}{v_1} \tag{5346}$$

$$\dot{x}(v_1, \mathbf{f}, \varepsilon) = \mathbf{f}\frac{\partial}{\partial\mathbf{f}}\dot{x}(v_1, \mathbf{f}, \varepsilon) \tag{5347}$$

3.5.21 Derivation 36

$$\mathrm{f}'\left(\dot{z},V,A\right)=A+V-\dot{z} \tag{5348}$$

$$-\frac{\mathrm{f}'\left(\dot{z},V,A\right)}{V}=-\frac{A+V-\dot{z}}{V} \tag{5349}$$

$$\int-\frac{\mathrm{f}'\left(\dot{z},V,A\right)}{V}dV=\int(A+V-\dot{z})dV \tag{5350}$$

$$\int-\frac{\mathrm{f}'\left(\dot{z},V,A\right)}{V}dV=\int(-\frac{A+V-\dot{z}}{V})dV \tag{5351}$$

$$\int(A+V-\dot{z})dV=\frac{V^2}{2}+V(A-\dot{z})+\mathbf{A} \tag{5352}$$

3.5.22 Derivation 39

$$(\mathbf{A},\varepsilon_0)=\mathbf{A}+\varepsilon_0 \tag{5353}$$

$$\int M(\mathbf{A},\varepsilon_0)d\mathbf{A}=\int(\mathbf{A}+\varepsilon_0)d\mathbf{A} \tag{5354}$$

$$(\int M(\mathbf{A},\varepsilon_0)d\mathbf{A})^{\varepsilon_0}=(\int(\mathbf{A}+\varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{5355}$$

$$(\int(\mathbf{A}+\varepsilon_0)d\mathbf{A})^{\varepsilon_0}=(\frac{\mathbf{A}^2}{2}+\mathbf{A}\varepsilon_0+x)^{\varepsilon_0} \tag{5356}$$

3.5.23 Derivation 40

$$\hat{p}(k,\hat{H}_\lambda)=\frac{\partial}{\partial\hat{H}_\lambda}\frac{\hat{H}_\lambda}{k} \tag{5357}$$

$$\hat{p}(k,\hat{H}_\lambda)-\frac{1}{k}=\frac{\partial}{\partial\hat{H}_\lambda}\frac{\hat{H}_\lambda}{k}-\frac{1}{k} \tag{5358}$$

$$\hat{p}(k,\hat{H}_\lambda)-\frac{\partial}{\partial\hat{H}_\lambda}\frac{\hat{H}_\lambda}{k}=0 \tag{5359}$$

$$-\frac{\partial}{\partial\hat{H}_\lambda}\frac{\hat{H}_\lambda}{k}+\frac{1}{k}=0 \tag{5360}$$

3.5.24 Derivation 41

$$\mathrm{F_x}\left(\pi\right)=e^{e^{\pi}} \tag{5361}$$

$$\mathrm{F_x}\left(\pi\right)-e^{e^{\pi}}=0 \tag{5362}$$

$$-\mathrm{F_x}\left(\pi\right)+e^{e^{\pi}}=-\mathrm{F_x}\left(\pi\right)+e^{e^{\pi}} \tag{5363}$$

$$0=-\mathrm{F_x}\left(\pi\right)+e^{e^{\pi}} \tag{5364}$$

$$0=F_g-P_g \tag{5365}$$

3.5.25 Derivation 43

$$(\nabla)=\cos\left(\nabla\right) \tag{5366}$$

$$G(\nabla)+\sin\left(\nabla\right)=\sin\left(\nabla\right)+\cos\left(\nabla\right) \tag{5367}$$

$$\int(G(\nabla)+\sin\left(\nabla\right))d\nabla=\int(\sin\left(\nabla\right)+\cos\left(\nabla\right))d\nabla \tag{5368}$$

$$\int(\varphi+G(\nabla)+\sin\left(\nabla\right))d\nabla-\int\cos\left(\nabla\right)d\nabla=\int(\varphi+\sin\left(\nabla\right)+\cos \tag{5369}$$

$$-G(\nabla)+\int(\varphi+G(\nabla)+\sin\left(\nabla\right))d\nabla-\int\cos\left(\nabla\right)d\nabla=-G(\nabla)+ \tag{5370}$$

3.5.26 Derivation 44

$$\nabla(f^*,\pi)=\frac{\partial}{\partial f^*}(\pi+f^*) \tag{5371}$$

$$\nabla^{f^*}(f^*,\pi)=(\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*} \tag{5372}$$

$$f^*\nabla^{f^*}(f^*,\pi)=f^*(\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*} \tag{5373}$$

$$f^*\nabla^{f^*}(f^*,\pi)=f^*(f^*\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*} \tag{5374}$$

$$f^*\nabla(f^*,\pi)=f^*\frac{\partial}{\partial f^*}(\pi+f^*) \tag{5375}$$

$$f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*\frac{\partial}{\partial f^*}(\pi+f^*))^{f^*}=f^*\frac{\partial}{\partial f^*}(\pi+f^*)+(f^*)^{f^*} \tag{5376}$$

3.5.27 Derivation 45

$$\eta'(\mathbf{r}, F_x) = \frac{F_x}{\mathbf{r}} \tag{5377}$$

$$\frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{5378}$$

$$-F_x + \frac{\partial}{\partial \mathbf{r}}\eta'(\mathbf{r}, F_x) = -F_x + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} \tag{5379}$$

$$-F_x + \frac{\partial}{\partial \mathbf{r}}\frac{F_x}{\mathbf{r}} = -F_x - \frac{F_x}{\mathbf{r}^2} \tag{5380}$$

3.5.28 Derivation 46

$$u(\lambda) = \sin(\lambda) \tag{5381}$$

$$\int u(\lambda)d\lambda = \int \sin(\lambda)d\lambda \tag{5382}$$

$$-\frac{\int u(\lambda)d\lambda}{\cos(\lambda)} = -\frac{\int \sin(\lambda)d\lambda}{\cos(\lambda)} \tag{5383}$$

$$-\frac{\int u(\lambda)d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{5384}$$

$$-\frac{\int \sin(\lambda)d\lambda}{\cos(\lambda)} = -\frac{n - \cos(\lambda)}{\cos(\lambda)} \tag{5385}$$

3.5.29 Derivation 47

$$\mathrm{f}'(\phi_1) = \phi_1 \tag{5386}$$

$$\frac{\mathrm{f}'(\phi_1)}{\phi_1} = 1 \tag{5387}$$

$$\frac{\phi_1}{\mathrm{f}'(\phi_1)}2 = \frac{\phi_1^2}{2} \tag{5388}$$

$$\frac{\phi_1^2}{\mathrm{f}'(\phi_1)} + n_2 = \frac{\phi_1^2}{\mathrm{f}'(\phi_1)} + \frac{\phi_1^2}{\mathrm{f}'(\phi_1)} \tag{5389}$$

$$\frac{\phi_1^3}{3} + n_2 = \hbar + \frac{\phi_1^3}{3} \tag{5390}$$

3.5.30 Derivation 48

$$\mathrm{a}^\dagger(\omega) = \int \log(\omega)d\omega \tag{5391}$$

$$-\rho + \mathrm{a}^\dagger(\omega) = \omega\log(\omega) - \omega \tag{5392}$$

$$(-\rho + \mathrm{a}^\dagger(\omega))^\omega = (\omega\log(\omega) - \omega)^\omega \tag{5393}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^\dagger(\omega))^\omega = \frac{d}{d\rho}(\omega\log(\omega) - \omega)^\omega \tag{5394}$$

3.5.31 Derivation 49

$$\hat{x}(f) = \int \log(f)df \tag{5395}$$

$$f + \hat{x}(f) = f + \int \log(f)df \tag{5396}$$

$$B + f\log(f) = f + \int \log(f)df \tag{5397}$$

3.5.32 Derivation 50

$$\mathbf{v}(C_2) = C_2 \tag{5398}$$

$$\frac{\mathbf{v}(C_2)}{C_2} = \frac{C_2}{C_2} \tag{5399}$$

$$\frac{C_2^2}{2} + \mathbf{p} = \frac{C_2^2}{2} + v \tag{5400}$$

3.5.33 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{5401}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^2} \tag{5402}$$

$$\frac{\partial}{\partial \mathbf{P}}\frac{E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} \tag{5403}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} \tag{5404}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} = \frac{2r_0}{\mathbf{P}^3} \tag{5405}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{5406}$$

3.5.34 Derivation 59

$$\mathrm{M_E}(\psi^*) = \log(\psi^*) \tag{5407}$$

$$\frac{d}{d\psi^*}\mathrm{M_E}(\psi^*) = \frac{d}{d\psi^*}\log(\psi^*) \tag{5408}$$

$$\frac{1}{\psi^*} = \frac{d}{d\psi^*}\log(\psi^*) \tag{5409}$$

$$(\frac{1}{\psi^*})^{\psi^*} = (\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*} \tag{5410}$$

$$((\frac{1}{\psi^*})^{\psi^*})^{\psi^*} = ((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*} \tag{5411}$$

$$(((\frac{1}{\psi^*})^{\psi^*})^{\psi^*})^{\psi^*} = (((\frac{d}{d\psi^*}\log(\psi^*))^{\psi^*})^{\psi^*})^{\psi^*} \tag{5412}$$

3.5.35 Derivation 64

$$\delta(q) = \log{(q)} \tag{5413}$$

$$q\delta(q) = q\log{(q)} \tag{5414}$$

$$0 = q\delta(q) - q\log{(q)} \tag{5415}$$

$$\frac{d}{dA_2}0 = \frac{\partial}{\partial A_2}(q\delta(q) - q\log{(q)}) \tag{5416}$$

$$\frac{d}{dA_2}0 = \frac{\partial}{\partial A_2}(A_2 - m_s + q\delta(q) - q\log{(q)}) \tag{5417}$$

3.5.36 Derivation 71

$$\mathrm{v_x}\left(G, L\right) = G - L \tag{5418}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right) = \frac{\partial}{\partial G}(G - L) \tag{5419}$$

$$(\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G = (\frac{\partial}{\partial G}(G - L))^G \tag{5420}$$

$$((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G = ((\frac{\partial}{\partial G}(G - L))^G)^G \tag{5421}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}\left(G, L\right))^G)^G)^G = 1 \tag{5422}$$

3.5.37 Derivation 72

$$\mathrm{A_1}\left(\theta_1\right) = \cos{(\theta_1)} \tag{5423}$$

$$\mathrm{A_1}^2\left(\theta_1\right) = \mathrm{A_1}\left(\theta_1\right)\cos{(\theta_1)} \tag{5424}$$

$$\frac{\mathrm{A_1}^2\left(\theta_1\right)\cos{(\theta_1)}}{2} = \frac{\cos^2{(\theta_1)}}{2} \tag{5425}$$

$$\int\frac{\mathrm{A_1}^2\left(\theta_1\right)}{2}d\theta_1 = \int\cos^2{(\theta_1)}d\theta_1 \tag{5426}$$

$$\frac{\theta_1}{2} + t_2 + \frac{\sin{(\theta_1)}\cos{(\theta_1)}}{2} = \int\cos^2{(\theta_1)}d\theta_1 \tag{5427}$$

3.5.38 Derivation 74

$$\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s(\mathbf{J}_P + \rho_b) \tag{5428}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b) \tag{5429}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}s(\mathbf{J}_P + \rho_b)}{\mathbf{J}_P} \tag{5430}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} \tag{5431}$$

3.5.39 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{5432}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin{(\hat{X})} \tag{5433}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = \frac{d^2}{d\hat{X}^2}\sin{(\hat{X})} \tag{5434}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{5435}$$

3.5.40 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{5436}$$

$$\dot{z}(L_\varepsilon) + 1 = \cos{(L_\varepsilon)} + 1 \tag{5437}$$

$$\frac{d}{dL_\varepsilon}(\dot{z}(L_\varepsilon) + 1) = \frac{d}{dL_\varepsilon}(\cos{(L_\varepsilon)} + 1) \tag{5438}$$

$$\int\frac{d}{dL_\varepsilon}(\dot{z}(L_\varepsilon)+1)dL_\varepsilon = \int\frac{d}{dL_\varepsilon}(\cos{(L_\varepsilon)}+1)dL_\varepsilon \tag{5439}$$

$$(\frac{d}{dL_\varepsilon}(\dot{z}(L_\varepsilon)+1)dL_\varepsilon)^\pi = (\frac{d}{dL_\varepsilon}(\dot{z}(L_\varepsilon)+1)dL_\varepsilon)^\pi \tag{5440}$$

3.5.41 Derivation 79

$$\mathrm{f}'\left(\varepsilon_0\right) = \sin{(\varepsilon_0)} \tag{5441}$$

$$0 = -\mathrm{f}'\left(\varepsilon_0\right) + \sin{(\varepsilon_0)} \tag{5442}$$

$$\frac{d}{d\varepsilon_0}0 = \frac{d}{d\varepsilon_0}(-\mathrm{f}'\left(\varepsilon_0\right) + \sin{(\varepsilon_0)}) \tag{5443}$$

$$0 = \cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right) \tag{5444}$$

$$\int 0 d\varepsilon_0 = \int(\cos{(\varepsilon_0)} - \frac{d}{d\varepsilon_0}\mathrm{f}'\left(\varepsilon_0\right))d\varepsilon_0 \tag{5445}$$

3.5.42 Derivation 80

$$(Q,\mathbf{M}) = \frac{\mathbf{M}}{Q} \tag{5446}$$

$$\frac{\partial}{\partial Q}S(Q,\mathbf{M}) = \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q} \tag{5447}$$

$$\int \frac{\partial}{\partial Q}S(Q,\mathbf{M})d\mathbf{M} = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} \tag{5448}$$

$$0 = \int \frac{\partial}{\partial Q}\frac{\mathbf{M}}{Q}d\mathbf{M} - \int \frac{\partial}{\partial Q}S(Q,\mathbf{M})d\mathbf{M} \tag{5449}$$

3.5.43 Derivation 81

$$\mathbf{F}(\hat{H}_l) = \int \sin(\hat{H}_l)d\hat{H}_l \tag{5450}$$

$$-\mathbf{F}(\hat{H}_l) = -\int \sin(\hat{H}_l)d\hat{H}_l \tag{5451}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-\int \sin(\hat{H}_l)d\hat{H}_l)^C \tag{5452}$$

$$(-\mathbf{F}(\hat{H}_l))^C = (-V + \cos(\hat{H}_l))^C \tag{5453}$$

3.5.44 Derivation 83

$$y(W,q,B) = W + \frac{q}{B} \tag{5454}$$

$$\frac{\partial}{\partial q}y(W,q,B) = \frac{\partial}{\partial q}(W + \frac{q}{B}) \tag{5455}$$

$$0 = -\frac{\partial}{\partial q}y(W,q,B) + \frac{\partial}{\partial q}(W + \frac{q}{B}) \tag{5456}$$

$$0 = -\frac{\partial}{\partial q}(W + \frac{q}{B}) + \frac{1}{B} \tag{5457}$$

3.5.45 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{5458}$$

$$\mathbf{S}(Z)e^Z = e^Z \int e^Z dZ \tag{5459}$$

$$(\mathbf{S}(Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{5460}$$

$$((\mathbf{S}(Z)e^Z)^\phi e^Z = (e^Z \int e^Z dZ)^\phi e^Z \tag{5461}$$

$$((\phi + e^Z)e^Z)^\phi = (e^Z \int e^Z dZ)^\phi \tag{5462}$$

$$e^{((\phi+e^Z)e^Z)^\phi} = e^{(e^Z \int e^Z dZ)^\phi} \tag{5463}$$

3.5.46 Derivation 85

$$\mathrm{A_x}(\varepsilon) = e^\varepsilon \tag{5464}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \frac{d}{d\varepsilon}e^\varepsilon \tag{5465}$$

$$\frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) = \frac{d^2}{d\varepsilon^2}e^\varepsilon \tag{5466}$$

$$\varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}e^\varepsilon \tag{5467}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) \tag{5468}$$

3.5.47 Derivation 87

$$\mathrm{r_0}(\eta,g) = \int (\eta + g)dg \tag{5469}$$

$$\frac{g^2}{2} + \mathrm{r_0}(\eta,g) = \frac{g^2}{2} + \int (\eta + g)dg \tag{5470}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \mathrm{r_0}(\eta,g) = 2\eta g + 2\sigma_p + g^2 \tag{5471}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g)dg = 2\eta g + 2\sigma_p + g^2 \tag{5472}$$

3.5.48 Derivation 93

$$\mathbf{M}(C_2,\hat{p}) = \int (-C_2 + \hat{p})dC_2 \tag{5473}$$

$$\mathbf{M}^{C_2}(C_2,\hat{p}) = (\int (-C_2 + \hat{p})dC_2)^{C_2} \tag{5474}$$

$$\mathbf{M}^{C_2}(C_2,\hat{p}) = (-\frac{C_2^2}{2} + C_2\hat{p} + \mathbf{D})^{C_2} \tag{5475}$$

3.5.49 Derivation 96

$$\psi(\mathbf{s},h) = \frac{h}{\mathbf{s}} \tag{5476}$$

$$\frac{\psi(\mathbf{s},h)}{\mathbf{s}} = \frac{h}{\mathbf{s}^2} \tag{5477}$$

$$\frac{\partial}{\partial h}\frac{\psi(\mathbf{s},h)}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}^2} \tag{5478}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s},h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h}-1} \tag{5479}$$

3.5.50 Derivation 98

$$\Psi(\delta) = \log(\delta) \tag{5480}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log(\delta) \tag{5481}$$

$$(\frac{d}{d\delta}\Psi(\delta))^{-\delta} = (\frac{d}{d\delta}\log(\delta))^{-\delta} \tag{5482}$$

$$(\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log(\delta) = \frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} \tag{5483}$$

4 llemma output

4.1 Perturbation: static

4.1.1 Derivation 1

$$\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \tag{5484}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d}{d\mathbf{s}}\frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \tag{5485}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) = \frac{d}{d\mathbf{s}}\cos(\mathbf{s}) \tag{5486}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) = -\sin(\mathbf{s}) \tag{5487}$$

$$\frac{d}{d\mathbf{s}}\sin(\mathbf{s}) = \mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{5488}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) = -\sin(\mathbf{s}) \tag{5489}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) = -\sin(\mathbf{s}) \tag{5490}$$

4.1.2 Derivation 2

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5491}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5492}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5493}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5494}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5495}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5496}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda = \Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) \tag{5497}$$

$$\Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d \tag{5498}$$

4.1.3 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{5499}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{5500}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{5501}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{5502}$$

4.1.4 Derivation 5

$$\mathrm{F_c}(\mathbf{J}, \mathbf{v}) = \int (\mathbf{J} + \mathbf{v})d\mathbf{J} \tag{5503}$$

$$\mathrm{F_c}(\mathbf{J}, \mathbf{v}) = \frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f \tag{5504}$$

$$\frac{\int (\mathbf{J} + \mathbf{v})d\mathbf{J}}{\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f} = 1 \tag{5505}$$

4.1.5 Derivation 7

$$\mathrm{C_d}(\mathbf{p}) = \sin(\mathbf{p}) \tag{5506}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = \frac{d}{d\mathbf{p}}\sin(\mathbf{p}) \tag{5507}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) = \cos(\mathbf{p}) \tag{5508}$$

$$\int F_c \cos(\mathbf{p})dF_c = \int F_c \frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c \tag{5509}$$

4.1.6 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{5510}$$

$$\frac{\partial}{\partial \varphi} \mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x \tag{5511}$$

$$\frac{\partial^2}{\partial \varphi^2} \mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{5512}$$

$$\frac{\partial^2}{\partial \varphi^2} \mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{5513}$$

$$(e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)})^{\sigma_x} = (e^0)^{\sigma_x} \tag{5514}$$

$$(e^{\frac{\partial^2}{\partial \varphi^2} \mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right)})^{\sigma_x} = 1 \tag{5515}$$

4.1.7 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) \tag{5516}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{5517}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}1 \tag{5518}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{5519}$$

$$0 = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{5520}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi)-1 = 0 \tag{5521}$$

4.1.8 Derivation 11

$$\mathrm{r_0}\left(\lambda, g\right) = \frac{\partial}{\partial g}(\lambda + g) \tag{5522}$$

$$\frac{\partial}{\partial g} \mathrm{r_0}\left(\lambda, g\right) = \frac{\partial}{\partial g}\frac{\partial}{\partial g}(\lambda + g) \tag{5523}$$

$$\frac{\partial}{\partial g} \mathrm{r_0}\left(\lambda, g\right) = 0 \tag{5524}$$

$$\frac{\partial}{\partial g} \mathrm{r_0}\left(\lambda, g\right) = 0 \tag{5525}$$

$$(\lambda + g)\frac{\partial^2}{\partial \lambda \partial g} \mathrm{r_0}\left(\lambda, g\right) = (\lambda + g)\frac{d}{d\lambda}\frac{\partial}{\partial g}(\lambda + g) \tag{5526}$$

$$(\lambda + g)\frac{\partial^2}{\partial \lambda \partial g} \mathrm{r_0}\left(\lambda, g\right) = (\lambda + g)\frac{d}{d\lambda}0 \tag{5527}$$

4.1.9 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log\left(\mathbf{g}\right) \tag{5528}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{5529}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{5530}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right)\right) = \cos\left(\frac{1}{\mathbf{g}}\right) \tag{5531}$$

4.1.10 Derivation 15

$$\mathrm{A_2}\left(\hat{H}, \mathbf{B}\right) = \log\left(\mathbf{B}^{\hat{H}}\right) \tag{5532}$$

$$\hat{H}_\lambda(y) = \cos\left(y\right) \tag{5533}$$

$$\frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)} = \frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)} \tag{5534}$$

$$\left(\frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)}\right)^y = \left(\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)}\right)^y \tag{5535}$$

4.1.11 Derivation 17

$$\hat{X}(f') = \cos\left(f'\right) \tag{5536}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos\left(f'\right) \tag{5537}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos\left(f'\right) \tag{5538}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos\left(f'\right) \tag{5539}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\left(f'\right)} = \frac{-\cos\left(f'\right)}{\mathrm{P_e}\left(f'\right)} \tag{5540}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\mathrm{P_e}\left(f'\right)} = -\frac{\cos\left(f'\right)}{\mathrm{P_e}\left(f'\right)} \tag{5541}$$

4.1.12 Derivation 18

$$W(P_e) = \log\left(P_e\right) \tag{5542}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log\left(P_e\right) \tag{5543}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{5544}$$

$$\int \frac{d}{dP_e}W(P_e)dP_e = \int \frac{1}{P_e}dP_e \tag{5545}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{5546}$$

4.1.13 Derivation 19

$$\mathrm{E}_{\lambda}\left(\hat{H}_l\right) = \int e^{\hat{H}_l} d\hat{H}_l \quad (5547)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_{\lambda}\left(\hat{H}_l\right) + e^{\hat{H}_l}) \quad (5548)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \int e^{\hat{H}_l} d\hat{H}_l + e^{\hat{H}_l}) \quad (5549)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l) \quad (5550)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \quad (5551)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 \quad (5552)$$

4.1.14 Derivation 27

$$\phi(x') = \int \log\left(x'\right) dx' \quad (5553)$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log\left(x'\right) dx' \quad (5554)$$

$$\frac{d}{dx'}\phi(x') = \int \frac{\partial}{\partial x'}\log\left(x'\right) dx' \quad (5555)$$

$$\frac{d}{dx'}\phi(x') = \int \frac{1}{x'} dx' \quad (5556)$$

$$\frac{d}{dx'}\phi(x') = \log\left(x'\right) \quad (5557)$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') \quad (5558)$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') \quad (5559)$$

$$\mathrm{t}_1\left(x', n_2\right) = \frac{\partial}{\partial x'}(n_2 + x'\log\left(x'\right) - x') \quad (5560)$$

4.1.15 Derivation 29

$$q(c_0) = e^{c_0} \quad (5561)$$

$$e^{-c_0}\int q(c_0) dc_0 = e^{-c_0}\int e^{c_0} dc_0 \quad (5562)$$

$$e^{-c_0}\int q(c_0) dc_0 = (n + e^{c_0})e^{-c_0} \quad (5563)$$

$$\frac{\int q(c_0) dc_0}{q(c_0)} = \frac{(n + e^{c_0})e^{-c_0}}{e^{c_0}} \quad (5564)$$

$$\frac{\int q(c_0) dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \quad (5565)$$

$$\frac{\int q(c_0) dc_0}{q(c_0)} = \frac{n + q(c_0)}{q(c_0)} \quad (5566)$$

4.1.16 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \quad (5567)$$

$$b^{A_x}(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \quad (5568)$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \quad (5569)$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} di = \int 0 di \quad (5570)$$

4.1.17 Derivation 32

$$\mathrm{P_e}\left(\dot{z}\right) = \sin\left(\dot{z}\right) \quad (5571)$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \frac{d}{d\dot{z}}\sin\left(\dot{z}\right) \quad (5572)$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \cos\left(\dot{z}\right) \quad (5573)$$

$$\mathrm{P_e}\left(\dot{z}\right)\frac{d}{d\dot{z}}\mathrm{P_e}\left(\dot{z}\right) = \mathrm{P_e}\left(\dot{z}\right)\cos\left(\dot{z}\right) \quad (5574)$$

4.1.18 Derivation 38

$$J(\phi_1) = \sin\left(\phi_1\right) \quad (5575)$$

$$\sin\left(\phi_1\right)\frac{d}{d\phi_1}J(\phi_1) = \sin\left(\phi_1\right)\cos\left(\phi_1\right) \quad (5576)$$

$$J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = J(\phi_1)\cos\left(\phi_1\right) \quad (5577)$$

4.1.19 Derivation 39

$$M(\mathbf{A},\varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{5578}$$

$$(\int M(\mathbf{A},\varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{5579}$$

$$(\int M(\mathbf{A},\varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{5580}$$

$$(\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{5581}$$

4.1.20 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{5582}$$

$$\int \mathrm{F_x}(\pi)d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{5583}$$

$$\int \mathrm{F_x}(\pi)d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{5584}$$

$$0 = F_g + \mathrm{Ei}\,(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi \tag{5585}$$

$$0 = F_g + \mathrm{Ei}\,(e^{\pi}) - \int \mathrm{F_x}(\pi)d\pi \tag{5586}$$

$$0 = F_g - P_g \tag{5587}$$

4.1.21 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c\cos(\lambda) \tag{5588}$$

$$\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c) = \frac{\partial}{\partial c}c\cos(\lambda) \tag{5589}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} = (\frac{\partial}{\partial c}c\cos(\lambda))^{\lambda} \tag{5590}$$

$$\cos^{\lambda}(\lambda) = \cos^{\lambda}(\lambda) \tag{5591}$$

$$\cos^{\lambda}(\lambda) = (\frac{\partial}{\partial c}c\cos(\lambda))^{\lambda} \tag{5592}$$

$$\cos^{\lambda}(\lambda) = (\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} \tag{5593}$$

4.1.22 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{5594}$$

$$\varphi + G(\nabla) + \sin(\nabla) = \varphi + \sin(\nabla) + \cos(\nabla) \tag{5595}$$

$$-G(\nabla) + \int (\varphi + G(\nabla) + \sin(\nabla))d\nabla - \int \cos(\nabla)d\nabla = -G(\nabla) + \tag{5596}$$

4.1.23 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{5597}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5598}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5599}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5600}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5601}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5602}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5603}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5604}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5605}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5606}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5607}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5608}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5609}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5610}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5611}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5612}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5613}$$

$$f^*\nabla(f^*, \pi) = f^* \tag{5614}$$

4.1.24 Derivation 48

$$\mathrm{a}^{\dagger}(\omega) = \int \log(\omega) d\omega \tag{5615}$$

$$\mathrm{a}^{\dagger}(\omega) = \omega \log(\omega) - \omega + \rho \tag{5616}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^{\dagger}(\omega))^{\omega} = \frac{d}{d\rho}(\omega \log(\omega) - \omega)^{\omega} \tag{5617}$$

4.1.25 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{5618}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \mathbf{s} \log(\mathbf{s}) - \mathbf{s} + \omega \tag{5619}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{5620}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \mathbf{s} \log(\mathbf{s}) + \mathbf{s} - \omega \tag{5621}$$

$$a(\mathbf{s}) = -\mathbf{s} \log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{5622}$$

4.1.26 Derivation 52

$$\mathrm{v_t}(t, \hat{X}) = \hat{X}^t \tag{5623}$$

$$\frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \frac{\partial}{\partial t} \hat{X}^t \tag{5624}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \frac{\partial}{\partial t} \hat{X}^t \tag{5625}$$

$$\hat{X} + \frac{\partial}{\partial t} \mathrm{v_t}(t, \hat{X}) = \hat{X} + \hat{X}^t \log(\hat{X}) \tag{5626}$$

$$\hat{X} + \frac{\partial}{\partial t} \hat{X}^t = \hat{X} + \hat{X}^t \log(\hat{X}) \tag{5627}$$

4.1.27 Derivation 53

$$\mathrm{A_y}(A) = e^A \tag{5628}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = (e^A)^A \tag{5629}$$

$$(\frac{d}{dA} \mathrm{A_y}(A))^A = \mathrm{A_y}^A(A) \tag{5630}$$

4.1.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{5631}$$

$$\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}} \tag{5632}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} \tag{5633}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = \frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^2} \tag{5634}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = \frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^2} \tag{5635}$$

4.1.29 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{5636}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \frac{d}{d\psi^*} \sin(\psi^*) \tag{5637}$$

$$\frac{d}{d\psi^*} C(\psi^*) = \cos(\psi^*) \tag{5638}$$

$$C(\psi^*) + \frac{d}{d\psi^*} C(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{5639}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{5640}$$

4.1.30 Derivation 58

$$\mathrm{E_x}(t_2) = \frac{1}{t_2} \tag{5641}$$

$$\int \mathrm{E_x}(t_2) dt_2 = \int \frac{1}{t_2} dt_2 \tag{5642}$$

$$\int \mathrm{E_x}(t_2) dt_2 = C_1 + \log(t_2) \tag{5643}$$

$$\int \mathrm{E_x}(t_2) dt_2 = C_1 + \log(t_2) \tag{5644}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \mathrm{E_x}(t_2) dt_2)^{t_2} \tag{5645}$$

$$(C_1 + \log(t_2))^{t_2} = (\int \frac{1}{t_2} dt_2)^{t_2} \tag{5646}$$

4.1.31 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{5647}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}(\mathbf{M} + s) \tag{5648}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + \frac{\partial}{\partial s}\frac{\partial}{\partial s}s \tag{5649}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + \frac{\partial}{\partial s}1 \tag{5650}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + 0 \tag{5651}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} \tag{5652}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} \tag{5653}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{5654}$$

4.1.32 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{5655}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{5656}$$

$$l(\varphi^*) - 1 = e^{\varphi^*} - 1 \tag{5657}$$

$$l(\varphi^*) - 1 = \frac{d}{d\varphi^*}e^{\varphi^*} - 1 \tag{5658}$$

$$l(\varphi^*) - 1 = \frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 \tag{5659}$$

4.1.33 Derivation 69

$$\hat{\mathbf{x}}(C_2) = \sin(C_2) \tag{5660}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \sin(C_2) \tag{5661}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) \tag{5662}$$

4.1.34 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{5663}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{5664}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = 1 \tag{5665}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = ((1^G)^G)^G \tag{5666}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = 1 \tag{5667}$$

4.1.35 Derivation 74

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} \tag{5668}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} \tag{5669}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} \tag{5670}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} \tag{5671}$$

$$\frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} = 1 + \frac{\rho_b}{\mathbf{J}_P} \tag{5672}$$

4.1.36 Derivation 76

$$r(\hat{X}) = \sin(\hat{X}) \tag{5673}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin(\hat{X}) \tag{5674}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos(\hat{X}) \tag{5675}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = \frac{d}{d\hat{X}}\cos(\hat{X}) \tag{5676}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin(\hat{X}) \tag{5677}$$

4.1.37 Derivation 77

$$A(\dot{z}) = e^{\sin(\dot{z})} \tag{5678}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = \frac{d}{d\dot{z}}e^{\sin(\dot{z})} \tag{5679}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = e^{\sin(\dot{z})}\cos(\dot{z}) \tag{5680}$$

$$(e^{-A(\dot{z})+\frac{d}{d\dot{z}}A(\dot{z})})^{\dot{z}} = (e^{-A(\dot{z})+e^{\sin(\dot{z})}\cos(\dot{z})})^{\dot{z}} \tag{5681}$$

4.1.38 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{5682}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon = \int \cos(L_\varepsilon)dL_\varepsilon \tag{5683}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon = \sin(L_\varepsilon) + C \tag{5684}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \sin(L_\varepsilon) + 1 + C \tag{5685}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \sin(L_\varepsilon) + 1 \tag{5686}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5687}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5688}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5689}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5690}$$

$$\int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin(L_\varepsilon) + 1 \tag{5691}$$

$$\int \dot{z}(L_\varepsilon)d \tag{5692}$$

4.1.39 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{5693}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{5694}$$

$$\int 0 d\varepsilon_0 = \int (\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0))d\varepsilon_0 \tag{5695}$$

4.1.40 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{5696}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{5697}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{5698}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{5699}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{5700}$$

$$e^{((\phi+e^Z)e^Z)^\phi} = e^{(e^Z\int e^Z dZ)^\phi} \tag{5701}$$

4.1.41 Derivation 85

$$+\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{5702}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{5703}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{5704}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{5705}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{5706}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) \tag{5707}$$

4.1.42 Derivation 87

$$\mathrm{r}_0(\eta, g) = \int (\eta + g) dg \tag{5708}$$

$$\frac{d}{dg} \mathrm{r}_0(\eta, g) = \frac{d}{dg} \int (\eta + g) dg \tag{5709}$$

$$\frac{d}{dg} \mathrm{r}_0(\eta, g) = \frac{d}{dg} (\eta g + \sigma_p + \frac{g^2}{2}) \tag{5710}$$

$$\frac{d}{dg} \mathrm{r}_0(\eta, g) = \eta + 2g \tag{5711}$$

$$\mathrm{r}_0(\eta, g) = \eta g + \sigma_p + \frac{g^2}{2} \tag{5712}$$

$$\mathrm{r}_0(\eta, g) + \int (\eta + g) dg = \eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg \tag{5713}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg = 2\eta g + 2\sigma_p + g^2 \tag{5714}$$

4.1.43 Derivation 89

$$\mathrm{g}'_\varepsilon(\phi) = \sin(\phi) \tag{5715}$$

$$-\cos(\phi) + \frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi) = -\cos(\phi) + \frac{d}{d\phi} \sin(\phi) \tag{5716}$$

$$-\cos(\phi) + \frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi) = 0 \tag{5717}$$

$$\frac{(-\cos(\phi) + \frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi))^\phi}{-\cos(\phi) + \frac{d}{d\phi} \sin(\phi)} = \frac{0^\phi}{-\cos(\phi) + \frac{d}{d\phi} \sin(\phi)} \tag{5718}$$

4.1.44 Derivation 90

$$\omega(\mu) = e^\mu \tag{5719}$$

$$\frac{e^\mu}{\omega(\mu)} = \frac{e^\mu}{e^\mu} \tag{5720}$$

$$\frac{e^\mu}{\omega(\mu)} = 1 \tag{5721}$$

$$\mathbf{J} + \mu = \int \frac{e^\mu}{\omega(\mu)} d\mu \tag{5722}$$

$$\mathbf{J} + \mu = \int 1 d\mu \tag{5723}$$

$$\mathbf{J} + \mu = \mu + \mathbf{J} \tag{5724}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \int \frac{e^\mu}{\omega(\mu)} d\mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{5725}$$

4.1.45 Derivation 92

$$\mathbf{J}(q) = \log(q) \tag{5726}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq} \log(q) \tag{5727}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{1}{q} \tag{5728}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{5729}$$

4.1.46 Derivation 94

$$\mathbf{p}(E_x) = \sin(e^{E_x}) \tag{5730}$$

$$\dot{y}(U) = \sin(U) \tag{5731}$$

$$\frac{d}{dU}\dot{y}(U) = \frac{d}{dU} \sin(U) \tag{5732}$$

$$\frac{d}{dU}\dot{y}(U) = \cos(U) \tag{5733}$$

$$\cos(U) + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos(U) + \frac{d}{dE_x} \sin(e^{E_x}) \tag{5734}$$

4.1.47 Derivation 95

$$\mathrm{v_y}(L) = e^L \tag{5735}$$

$$\frac{d}{dL} \mathrm{v_y}(L) = \frac{d}{dL} e^L \tag{5736}$$

$$\frac{d^2}{dL^2} \mathrm{v_y}(L) = \frac{d^2}{dL^2} e^L \tag{5737}$$

$$\frac{d^2}{dL^2} \mathrm{v_y}(L) = e^L \tag{5738}$$

$$2\,\mathrm{v_y}(L) = \mathrm{v_y}(L) + \frac{d^2}{dL^2} \mathrm{v_y}(L) \tag{5739}$$

4.1.48 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{5740}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{5741}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{5742}$$

$$\frac{\frac{\partial}{\partial h}\psi(\mathbf{s}, h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h}-1} \tag{5743}$$

4.1.49 Derivation 98

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5744}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5745}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5746}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5747}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5748}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5749}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5750}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5751}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5752}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5753}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5754}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5755}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5756}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{5757}$$

4.1.50 Derivation 99

$$\mathbf{S}(G, \Omega) = G + \Omega \tag{5758}$$

$$\mathrm{f}_{\mathbf{p}}(G, \Omega) = (G + \Omega)\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) \tag{5759}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\partial}{\partial \Omega}(G + \Omega) \tag{5760}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = 1 \tag{5761}$$

$$\mathrm{f}_{\mathbf{p}}(G, \Omega) = (G+\Omega)\frac{\partial}{\partial \Omega}(G+\Omega)\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega)\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = 1 \tag{5762}$$

4.2 Perturbation: VR

4.2.1 Derivation 1

$$\beta(\gamma) = \frac{d}{d\gamma}\sin(\gamma) \tag{5763}$$

$$\frac{d}{d\gamma}\beta(\gamma) = \frac{d}{d\gamma}\frac{d}{d\gamma}\sin(\gamma) \tag{5764}$$

$$\frac{d}{d\gamma}\beta(\gamma) = \frac{d}{d\gamma}\cos(\gamma) \tag{5765}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5766}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5767}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5768}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5769}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5770}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5771}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5772}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5773}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5774}$$

$$\frac{d}{d\gamma}\beta(\gamma) = -\sin(\gamma) \tag{5775}$$

4.2.2 Derivation 2

$$\nu(\tau) = e^{\tau} \tag{5776}$$

$$\tau + \int \nu(\tau) d\tau = \gamma + \tau + e^{\tau} \tag{5777}$$

$$\tau + \int \nu(\tau) d\tau = \gamma + \tau + \nu(\tau) \tag{5778}$$

4.2.3 Derivation 3

$$\gamma(\iota, \beta) = \int (-\beta + \iota) d\beta \tag{5779}$$

$$\beta\gamma(\iota, \beta) = \beta \int (-\beta + \iota) d\beta \tag{5780}$$

$$\beta\gamma(\iota, \beta) = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{5781}$$

$$\beta \int (-\beta + \iota) d\beta = \beta(-\frac{\beta^2}{2} + \beta\iota + \nu) \tag{5782}$$

4.2.4 Derivation 5

$$\alpha(\kappa, \gamma) = \int (\gamma + \kappa) d\gamma \tag{5783}$$

$$\alpha(\kappa, \gamma) = \frac{\gamma^2}{2} + \gamma\kappa + \zeta \tag{5784}$$

$$\frac{\int (\gamma + \kappa) d\gamma}{\frac{\gamma^2}{2} + \gamma\kappa + \zeta} = 1 \tag{5785}$$

4.2.5 Derivation 7

$$\tau(\nu) = \sin{(\nu)} \tag{5786}$$

$$\frac{d}{d\nu}\tau(\nu) = \frac{d}{d\nu}\sin{(\nu)} \tag{5787}$$

$$\frac{d}{d\nu}\tau(\nu) = \cos{(\nu)} \tag{5788}$$

$$\int \alpha \cos{(\nu)} d\alpha = \int \alpha \frac{d}{d\nu}\sin{(\nu)} d\alpha \tag{5789}$$

4.2.6 Derivation 8

$$o(\alpha, \beta) = -\alpha + \beta \tag{5790}$$

$$\frac{\partial}{\partial\beta} o(\alpha, \beta) = -1 \tag{5791}$$

$$\frac{\partial^2}{\partial\beta^2} o(\alpha, \beta) = 0 \tag{5792}$$

$$(e^{\frac{\partial^2}{\partial\beta^2} o(\alpha,\beta)})^{\alpha} = (e^{0})^{\alpha} \tag{5793}$$

$$(e^{\frac{\partial^2}{\partial\beta^2} o(\alpha,\beta)})^{\alpha} = 1 \tag{5794}$$

4.2.7 Derivation 9

4.2.8 Derivation 11

$$\gamma(\kappa, \upsilon) = \frac{\partial}{\partial\kappa}(\kappa + \upsilon) \tag{5795}$$

$$\frac{\partial}{\partial\kappa}\gamma(\kappa, \upsilon) = \frac{\partial}{\partial\kappa}\frac{\partial}{\partial\kappa}(\kappa + \upsilon) \tag{5796}$$

$$\frac{\partial}{\partial\kappa}\gamma(\kappa, \upsilon) = 0 \tag{5797}$$

$$\frac{\partial}{\partial\kappa}\gamma(\kappa, \upsilon) = 0 \tag{5798}$$

$$(\kappa + \upsilon)\frac{\partial^2}{\partial\upsilon\partial\kappa}\gamma(\kappa, \upsilon) = (\kappa + \upsilon)\frac{d}{d\upsilon}0 \tag{5799}$$

$$(\kappa + \upsilon)\frac{\partial^2}{\partial\upsilon\partial\kappa}\gamma(\kappa, \upsilon) = (\kappa + \upsilon)\frac{d}{d\upsilon}0 \tag{5800}$$

4.2.9 Derivation 12

$$\zeta(\gamma) = \log{(\gamma)} \tag{5801}$$

$$\frac{d}{d\gamma}\zeta(\gamma) = \frac{d}{d\gamma}\log{(\gamma)} \tag{5802}$$

$$\frac{d}{d\gamma}\zeta(\gamma) = \frac{1}{\gamma} \tag{5803}$$

$$\cos{(\frac{d}{d\gamma}\zeta(\gamma))} = \cos{(\frac{1}{\gamma})} \tag{5804}$$

$$\cos{(\frac{d}{d\gamma}\log{(\gamma)})} = \cos{(\frac{1}{\gamma})} \tag{5805}$$

4.2.10 Derivation 15

$$\nu(\tau, \beta) = \log{(\beta^{\tau})} \tag{5806}$$

$$\zeta(\xi) = \cos{(\xi)} \tag{5807}$$

$$\frac{\zeta(\xi)}{\log{(\beta)}} = \frac{\cos{(\xi)}}{\log{(\beta)}} \tag{5808}$$

$$(\frac{\zeta(\xi)}{\log{(\beta)}})^{\xi} = (\frac{\cos{(\xi)}}{\log{(\beta)}})^{\xi} \tag{5809}$$

4.2.11 Derivation 17

$$\alpha(\nu) = \cos{(\nu)} \tag{5810}$$

$$\frac{d}{d\nu}\alpha(\nu) = \frac{d}{d\nu}\cos{(\nu)} \tag{5811}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = \frac{d^2}{d\nu^2}\cos{(\nu)} \tag{5812}$$

$$\frac{d^2}{d\nu^2}\alpha(\nu) = -\cos{(\nu)} \tag{5813}$$

$$\frac{\frac{d^2}{d\nu^2}\alpha(\nu)}{\tau(\nu)} = \frac{-\cos{(\nu)}}{\tau(\nu)} \tag{5814}$$

$$\frac{\frac{d^2}{d\nu^2}\alpha(\nu)}{\tau(\nu)} = -\frac{\cos{(\nu)}}{\tau(\nu)} \tag{5815}$$

4.2.12 Derivation 18

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \int \frac{1}{\zeta}d\zeta \tag{5816}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5817}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5818}$$

$$\int \frac{1}{\zeta}d\zeta = \log{(\zeta)} + C \tag{5819}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \int \frac{1}{\zeta}d\zeta \tag{5820}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5821}$$

$$\int \frac{1}{\zeta}d\zeta = \log{(\zeta)} + C \tag{5822}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5823}$$

$$\int \frac{1}{\zeta}d\zeta = \log{(\zeta)} + C \tag{5824}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5825}$$

$$\int \frac{1}{\zeta}d\zeta = \log{(\zeta)} + C \tag{5826}$$

$$\int \frac{d}{d\zeta}\log{(\zeta)}d\zeta = \log{(\zeta)} + C \tag{5827}$$

$$\int \frac{1}{\zeta}d\zeta = \tag{5828}$$

4.2.13 Derivation 19

$$\xi(\zeta) = \int e^{\zeta}d\zeta \tag{5829}$$

$$0 = (\alpha + e^{\zeta})(\alpha - \xi(\zeta) + e^{\zeta})^2 \tag{5830}$$

$$0 = (\alpha + e^{\zeta})(\alpha - \int e^{\zeta}d\zeta + e^{\zeta})^2 \tag{5831}$$

$$0 = (\alpha + e^{\zeta})(\alpha + e^{\zeta} - \int e^{\zeta}d\zeta)^2 \tag{5832}$$

4.2.14 Derivation 27

$$\xi(\alpha) = \int \log{(\alpha)}d\alpha \tag{5833}$$

$$\tau(\alpha, \nu) = \frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{5834}$$

$$\frac{d}{d\alpha}\xi(\alpha) = \frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{5835}$$

$$\tau(\alpha, \nu)e^{-\frac{d}{d\alpha}\xi(\alpha)} = e^{-\frac{d}{d\alpha}\xi(\alpha)}\frac{\partial}{\partial\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{5836}$$

$$\tau(\alpha, \nu)e^{-\frac{d}{d\alpha}\xi(\alpha)} = e^{-\frac{d}{d\alpha}\xi(\alpha)}\frac{d}{d\alpha}(\alpha\log{(\alpha)} - \alpha + \nu) \tag{5837}$$

$$\tau(\alpha, \nu)e^{-\frac{d}{d\alpha}\xi(\alpha)} = e^{-\frac{d}{d\alpha}\xi(\alpha)}\frac{d}{d\alpha}\xi(\alpha) \tag{5838}$$

4.2.15 Derivation 29

$$\zeta(\iota) = e^{\iota} \tag{5839}$$

$$e^{-\iota} \int \zeta(\iota) d\iota = e^{-\iota} \int e^{\iota} d\iota \tag{5840}$$

$$e^{-\iota} \int \zeta(\iota) d\iota = (\alpha + e^{\iota}) e^{-\iota} \tag{5841}$$

$$\frac{\int \zeta(\iota) d\iota}{\zeta(\iota)} = \frac{(\alpha + e^{\iota}) e^{-\iota}}{e^{\iota}} \tag{5842}$$

$$\frac{\int \zeta(\iota) d\iota}{\zeta(\iota)} = \frac{\alpha + \zeta(\iota)}{\zeta(\iota)} \tag{5843}$$

4.2.16 Derivation 30

$$\xi(\gamma, \tau) = \frac{\partial}{\partial \tau} (\gamma - \tau) \tag{5844}$$

$$\xi^{\tau}(\gamma, \tau) = \frac{\partial}{\partial \tau} (\gamma - \tau) \tag{5845}$$

$$-(-1)^{\tau} + \xi^{\tau}(\gamma, \tau) = 0 \tag{5846}$$

$$\int \frac{-(-1)^{\tau} + \xi^{\tau}(\gamma, \tau)}{\gamma} d\gamma = \int 0 d\gamma \tag{5847}$$

4.2.17 Derivation 32

$$\beta(\tau) = \sin(\tau) \tag{5848}$$

$$\frac{d}{d\tau} \beta(\tau) = \frac{d}{d\tau} \sin(\tau) \tag{5849}$$

$$\frac{d}{d\tau} \beta(\tau) = \cos(\tau) \tag{5850}$$

$$\frac{d}{d\tau} \beta(\tau) = \cos(\tau) \tag{5851}$$

$$\beta(\tau) \frac{d}{d\tau} \beta(\tau) = \beta(\tau) \cos(\tau) \tag{5852}$$

$$\frac{d}{d\tau} \beta(\tau) = \cos(\tau) \tag{5853}$$

$$\frac{d}{d\tau} \beta(\tau) = \cos(\tau) \tag{5854}$$

$$\beta(\tau) \frac{d}{d\tau} \beta(\tau) = \beta(\tau) \cos(\tau) \tag{5855}$$

4.2.18 Derivation 38

$$\gamma(\xi) = \sin(\xi) \tag{5856}$$

$$\frac{d}{d\xi} \gamma(\xi) = \frac{d}{d\xi} \sin(\xi) \tag{5857}$$

$$\sin(\xi) \frac{d}{d\xi} \gamma(\xi) = \sin(\xi) \frac{d}{d\xi} \sin(\xi) \tag{5858}$$

$$\sin(\xi) \frac{d}{d\xi} \gamma(\xi) = \sin(\xi) \cos(\xi) \tag{5859}$$

$$\gamma(\xi) \frac{d}{d\xi} \gamma(\xi) = \sin(\xi) \cos(\xi) \tag{5860}$$

$$\gamma(\xi) \frac{d}{d\xi} \gamma(\xi) = \gamma(\xi) \cos(\xi) \tag{5861}$$

4.2.19 Derivation 39

$$\gamma(\beta, \nu) = \beta + \nu \tag{5862}$$

$$\int \gamma(\beta, \nu) d\nu = \int (\beta + \nu) d\nu \tag{5863}$$

$$(\int \gamma(\beta, \nu) d\nu)^{\beta} = (\int (\beta + \nu) d\nu)^{\beta} \tag{5864}$$

$$(\int (\beta + \nu) d\nu)^{\beta} = (\beta\nu + \frac{\nu^2}{2} + \tau)^{\beta} \tag{5865}$$

$$(\int (\beta + \nu) d\nu)^{\beta} = (\beta\nu + \frac{\nu^2}{2} + \tau)^{\beta} \tag{5866}$$

4.2.20 Derivation 41

$$o(\xi) = e^{e^{\xi}} \tag{5867}$$

$$\int o(\xi) d\xi = \iota + \operatorname{Ei}(e^{\xi}) \tag{5868}$$

$$\int o(\xi) d\xi = \iota + \operatorname{Ei}(e^{\xi}) \tag{5869}$$

$$0 = \zeta + \operatorname{Ei}(e^{\xi}) - \int o(\xi) d\xi \tag{5870}$$

$$0 = \zeta + \operatorname{Ei}(e^{\xi}) - \int o(\xi) d\xi \tag{5871}$$

$$0 = \zeta + \operatorname{Ei}(e^{\xi}) - \int o(\xi) d\xi \tag{5872}$$

$$0 = -\iota + \zeta + \operatorname{Ei}(e^{\xi}) - \int o(\xi) d\xi \tag{5873}$$

4.2.21 Derivation 42

$$\upsilon(\kappa,\nu) = \kappa\cos{(\nu)} \tag{5874}$$

$$\frac{\partial}{\partial\kappa}\upsilon(\kappa,\nu) = \frac{\partial}{\partial\kappa}\kappa\cos{(\nu)} \tag{5875}$$

$$(\frac{\partial}{\partial\kappa}\upsilon(\kappa,\nu))^{\nu} = (\frac{\partial}{\partial\kappa}\kappa\cos{(\nu)})^{\nu} \tag{5876}$$

$$\cos^{\nu}{(\nu)} = \cos^{\nu}{(\nu)} \tag{5877}$$

$$\cos^{\nu}{(\nu)} = (\frac{\partial}{\partial\kappa}\kappa\cos{(\nu)})^{\nu} \tag{5878}$$

$$\cos^{\nu}{(\nu)} = (\frac{\partial}{\partial\kappa}\upsilon(\kappa,\nu))^{\nu} \tag{5879}$$

4.2.22 Derivation 43

$$\alpha(\iota) = \cos{(\iota)} \tag{5880}$$

$$o+\alpha(\iota)+\sin{(\iota)} = o+\sin{(\iota)}+\cos{(\iota)} \tag{5881}$$

$$o+\alpha(\iota)+\sin{(\iota)} = o+\sin{(\iota)}+\cos{(\iota)} \tag{5882}$$

$$\int(o+\alpha(\iota)+\sin{(\iota)})d\iota = \int(o+\sin{(\iota)}+\cos{(\iota)})d\iota \tag{5883}$$

$$\int\cos{(\iota)}d\iota = \int\cos{(\iota)}d\iota \tag{5884}$$

$$-\alpha(\iota)+\int(o+\alpha(\iota)+\sin{(\iota)})d\iota-\int\cos{(\iota)}d\iota = -\alpha(\iota)+\int(o+\sin{(\iota)}+\cos{(\iota)})d\iota-\int\cos{(\iota)}d\iota \tag{5885}$$

4.2.23 Derivation 44

$$o(\xi,\zeta) = \frac{\partial}{\partial\zeta}(\xi+\zeta) \tag{5886}$$

$$\zeta o(\xi,\zeta) = \zeta \tag{5887}$$

$$\zeta\frac{\partial}{\partial\zeta}(\xi+\zeta) = \zeta \tag{5888}$$

$$\zeta\frac{\partial}{\partial\zeta}(\xi+\zeta)+(\zeta\frac{\partial}{\partial\zeta}(\xi+\zeta))^{\zeta} = \zeta\frac{\partial}{\partial\zeta}(\xi+\zeta)+\zeta^{\zeta} \tag{5889}$$

4.2.24 Derivation 48

$$o(\upsilon) = \int\log{(\upsilon)}d\upsilon \tag{5890}$$

$$o(\upsilon) = \beta+\upsilon\log{(\upsilon)}-\upsilon \tag{5891}$$

$$\frac{\partial}{\partial\beta}o(\upsilon) = \frac{\partial}{\partial\beta}(\beta+\upsilon\log{(\upsilon)}-\upsilon) \tag{5892}$$

$$\frac{\partial}{\partial\beta}o(\upsilon) = \frac{\partial}{\partial\beta}\beta+\frac{\partial}{\partial\beta}\upsilon\log{(\upsilon)}-\frac{\partial}{\partial\beta}\upsilon \tag{5893}$$

$$\frac{\partial}{\partial\beta}o(\upsilon) = 1+\frac{\partial}{\partial\beta}\upsilon\log{(\upsilon)}-0 \tag{5894}$$

$$\frac{\partial}{\partial\beta}o(\upsilon) = 1+\frac{\partial}{\partial\beta}\upsilon\log{(\upsilon)} \tag{5895}$$

$$\frac{\partial}{\partial\beta}(-\beta+o(\upsilon))^{\upsilon} = \frac{\partial}{\partial\beta}(\upsilon\log{(\upsilon)}-\upsilon)^{\upsilon} \tag{5896}$$

4.2.25 Derivation 51

$$\nu(\xi) = \log{(\xi)} \tag{5897}$$

$$\tau(\xi) = \nu(\xi)-\int\nu(\xi)d\xi \tag{5898}$$

$$\int\nu(\xi)d\xi = \kappa+\xi\log{(\xi)}-\xi \tag{5899}$$

$$\tau(\xi) = -\kappa-\xi\log{(\xi)}+\xi+\nu(\xi) \tag{5900}$$

4.2.26 Derivation 52

$$\upsilon(\xi,\kappa) = \xi^{\kappa} \tag{5901}$$

$$\frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \frac{\partial}{\partial\kappa}\xi^{\kappa} \tag{5902}$$

$$\xi+\frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \xi+\frac{\partial}{\partial\kappa}\xi^{\kappa} \tag{5903}$$

$$\xi+\frac{\partial}{\partial\kappa}\upsilon(\xi,\kappa) = \xi+\xi^{\kappa}\log{(\xi)} \tag{5904}$$

$$\xi+\frac{\partial}{\partial\kappa}\xi^{\kappa} = \xi+\xi^{\kappa}\log{(\xi)} \tag{5905}$$

4.2.27 Derivation 53

$$\kappa(\nu) = e^{\nu} \tag{5906}$$

$$(\frac{d}{d\nu}\kappa(\nu))^{\nu} = (e^{\nu})^{\nu} \tag{5907}$$

$$(\frac{d}{d\nu}\kappa(\nu))^{\nu} = \kappa^{\nu}(\nu) \tag{5908}$$

4.2.28 Derivation 54

$$\zeta(\tau,\xi) = \frac{\xi}{\tau} \tag{5909}$$

$$\frac{\partial}{\partial\tau}\zeta(\tau,\xi) = \frac{\partial}{\partial\tau}\frac{\xi}{\tau} \tag{5910}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} = \frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} \tag{5911}$$

$$\frac{\frac{\partial}{\partial\tau}\zeta(\tau,\xi)}{\tau} - \frac{\zeta(\tau,\xi)}{\tau^2} = \frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\frac{\xi}{\tau}}{\tau^2} \tag{5912}$$

$$\frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^2} = \frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\frac{\xi}{\tau}}{\tau^2} \tag{5913}$$

$$\frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\xi}{\tau^2} = \frac{\frac{\partial}{\partial\tau}\frac{\xi}{\tau}}{\tau} - \frac{\frac{\xi}{\tau}}{\tau^2} \tag{5914}$$

4.2.29 Derivation 56

$$\kappa(\beta) = \sin(\beta) \tag{5915}$$

$$\frac{d}{d\beta}\kappa(\beta) = \frac{d}{d\beta}\sin(\beta) \tag{5916}$$

$$\frac{d}{d\beta}\kappa(\beta) = \cos(\beta) \tag{5917}$$

$$\kappa(\beta) + \frac{d}{d\beta}\kappa(\beta) = \sin(\beta) + \cos(\beta) \tag{5918}$$

$$\kappa(\beta) + \cos(\beta) = \sin(\beta) + \cos(\beta) \tag{5919}$$

4.2.30 Derivation 58

$$\kappa(\beta) = \frac{1}{\beta} \tag{5920}$$

$$\int \kappa(\beta)d\beta = \int \frac{1}{\beta}d\beta \tag{5921}$$

$$\int \kappa(\beta)d\beta = \iota + \log(\beta) \tag{5922}$$

$$\int \kappa(\beta)d\beta = \iota + \log(\beta) \tag{5923}$$

$$(\iota + \log(\beta))^{\beta} = (\int \kappa(\beta)d\beta)^{\beta} \tag{5924}$$

$$(\iota + \log(\beta))^{\beta} = (\iota + \log(\beta))^{\beta} \tag{5925}$$

4.2.31 Derivation 61

$$\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}(\nu+\tau) \tag{5926}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5927}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5928}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5929}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5930}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5931}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5932}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \frac{\partial}{\partial\nu}\frac{\partial}{\partial\nu}(\nu+\tau) \tag{5933}$$

$$\frac{\partial}{\partial\nu}\alpha(\nu,\tau) = \tag{5934}$$

4.2.32 Derivation 67

$$\nu(\iota) = \frac{d}{d\iota}e^{\iota} \tag{5935}$$

$$\nu(\iota) = e^{\iota} \tag{5936}$$

$$\nu(\iota) - 1 = \frac{d}{d\iota}e^{\iota} - 1 \tag{5937}$$

$$\nu(\iota) - 1 = e^{\iota} - 1 \tag{5938}$$

$$\nu(\iota) - 1 = \frac{d^2}{d\iota^2}e^{\iota} - 1 \tag{5939}$$

4.2.33 Derivation 69

$$\tau(\upsilon) = \sin(\upsilon) \tag{5940}$$

$$\iota + \tau(\upsilon) = \alpha + \sin(\upsilon) \tag{5941}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5942}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5943}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5944}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5945}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5946}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5947}$$

$$\frac{\partial}{\partial\upsilon}(\iota + \tau(\upsilon)) = \frac{\partial}{\partial\upsilon}(\alpha + \sin(\upsilon)) \tag{5948}$$

4.2.34 Derivation 71

$$\gamma(\beta, \kappa) = \beta - \kappa \tag{5949}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta, \kappa) = \frac{\partial}{\partial\beta}(\beta - \kappa) \tag{5950}$$

$$\frac{\partial}{\partial\beta}\gamma(\beta, \kappa) = 1 \tag{5951}$$

$$(((\frac{\partial}{\partial\beta}\gamma(\beta, \kappa))^{\beta})^{\beta})^{\beta} = ((1^{\beta})^{\beta})^{\beta} \tag{5952}$$

$$(((\frac{\partial}{\partial\beta}\gamma(\beta, \kappa))^{\beta})^{\beta})^{\beta} = 1 \tag{5953}$$

4.2.35 Derivation 74

$$\beta(\alpha, o, \nu) = o(\alpha + \nu) \tag{5954}$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \frac{\partial}{\partial o}o(\alpha + \nu) \tag{5955}$$

$$\frac{\partial}{\partial o}\beta(\alpha, o, \nu) = \alpha + \nu \tag{5956}$$

$$\frac{\frac{\partial}{\partial o}\beta(\alpha, o, \nu)}{\nu} = \frac{\alpha + \nu}{\nu} \tag{5957}$$

4.2.36 Derivation 76

$$\kappa(\xi) = \sin(\xi) \tag{5958}$$

$$\frac{d}{d\xi}\kappa(\xi) = \cos(\xi) \tag{5959}$$

$$\frac{d^2}{d\xi^2}\kappa(\xi) = -\sin(\xi) \tag{5960}$$

4.2.37 Derivation 77

$$\kappa(\alpha) = e^{\sin(\alpha)} \tag{5961}$$

$$\frac{d}{d\alpha}\kappa(\alpha) = \frac{d}{d\alpha}e^{\sin(\alpha)} \tag{5962}$$

$$\frac{d}{d\alpha}\kappa(\alpha) = e^{\sin(\alpha)}\cos(\alpha) \tag{5963}$$

$$(e^{-\kappa(\alpha) + \frac{d}{d\alpha}\kappa(\alpha)})^{\alpha} = (e^{-\kappa(\alpha) + e^{\sin(\alpha)}\cos(\alpha)})^{\alpha} \tag{5964}$$

4.2.38 Derivation 78

$$\beta(\upsilon) = \cos(\upsilon) \tag{5965}$$

$$\int \beta(\upsilon)d\upsilon = \int \cos(\upsilon)d\upsilon \tag{5966}$$

$$\int \beta(\upsilon)d\upsilon = \sin(\upsilon) + C \tag{5967}$$

$$\int \beta(\upsilon)d\upsilon + 1 = \sin(\upsilon) + 1 \tag{5968}$$

$$\int \beta(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \tag{5969}$$

$$\int \beta(\upsilon)d\upsilon + 1 = \gamma + \sin(\upsilon) + 1 \tag{5970}$$

$$(\tau + \sin(\upsilon) + 1)^{\gamma} = (\gamma + \sin(\upsilon) + 1)^{\gamma} \tag{5971}$$

4.2.39 Derivation 79

$$\alpha(o) = \sin(o) \tag{5972}$$

$$0 = \cos(o) - \frac{d}{do}\alpha(o) \tag{5973}$$

$$0 = \cos(o) - \frac{d}{do}\sin(o) \tag{5974}$$

$$0 = \cos(o) - \cos(o) \tag{5975}$$

$$\int 0 do = \int (\cos(o) - \frac{d}{do}\alpha(o)) do \tag{5976}$$

4.2.40 Derivation 84

$$o(\beta) = \int e^{\beta} d\beta \tag{5977}$$

$$o(\beta) = \tau + e^{\beta} \tag{5978}$$

$$(\tau + e^{\beta})e^{\beta} = (\zeta + e^{\beta})e^{\beta} \tag{5979}$$

$$e^{((\zeta + e^{\beta})e^{\beta})^{\zeta}} = e^{(e^{\beta} \int e^{\beta} d\beta)^{\zeta}} \tag{5980}$$

4.2.41 Derivation 85

4.2.42 Derivation 87

$$o(\upsilon, \kappa) = \int (\kappa + \upsilon) d\kappa \tag{5981}$$

$$o(\upsilon, \kappa) = \frac{\kappa^2}{2} + \kappa\upsilon + \nu \tag{5982}$$

$$\frac{\kappa^2}{2} + \kappa\upsilon + \nu + \int (\kappa + \upsilon) d\kappa = \kappa^2 + 2\kappa\upsilon + 2\nu \tag{5983}$$

4.2.43 Derivation 89

$$\nu(\zeta) = \sin(\zeta) \tag{5984}$$

$$-\cos(\zeta) + \frac{d}{d\zeta}\nu(\zeta) = -\cos(\zeta) + \frac{d}{d\zeta}\sin(\zeta) \tag{5985}$$

$$-\cos(\zeta) + \frac{d}{d\zeta}\nu(\zeta) = 0 \tag{5986}$$

$$\frac{(-\cos(\zeta) + \frac{d}{d\zeta}\nu(\zeta))^{\zeta}}{-\cos(\zeta) + \frac{d}{d\zeta}\sin(\zeta)} = \frac{0^{\zeta}}{-\cos(\zeta) + \frac{d}{d\zeta}\sin(\zeta)} \tag{5987}$$

4.2.44 Derivation 90

$$o(\tau) = e^{\tau} \tag{5988}$$

$$\frac{1}{o(\tau)} = e^{-\tau} \tag{5989}$$

$$\gamma + \tau = \int \frac{e^{\tau}}{o(\tau)} d\tau \tag{5990}$$

$$\gamma + \tau = \int \frac{e^{\tau}}{e^{\tau}} d\tau \tag{5991}$$

$$\gamma + \tau = \int d\tau \tag{5992}$$

$$\gamma + \tau = \tau + C \tag{5993}$$

$$\gamma + \tau = \tau + C \tag{5994}$$

$$\gamma + \tau = \tau + C \tag{5995}$$

$$\gamma + \tau = \tau + C \tag{5996}$$

$$\gamma + \tau = \tau + C \tag{5997}$$

$$\gamma + \tau = \tau + C \tag{5998}$$

$$\gamma + \tau = \tau + C \tag{5999}$$

$$\gamma + \tau = \tau + C \tag{6000}$$

$$\gamma + \tau = \tau + C \tag{6001}$$

$$\gamma + \tau = \tau + C \tag{6002}$$

$$\gamma + \tau = \tau + C \tag{6003}$$

$$\gamma + \tau = \tau + C \tag{6004}$$

$$\gamma + \tau = \tau + C \tag{6005}$$

$$\gamma + \tau = \tau + C \tag{6006}$$

$$\gamma + \tau = \tau + C \tag{6007}$$

$$\gamma + \tau = \tau + C \tag{6008}$$

$$\gamma + \tau = \tau + C \tag{6009}$$

$$\gamma + \tau = \tau + C \tag{6010}$$

$$\gamma + \tau = \tau + C \tag{6011}$$

$$\gamma + \tau = \tau + C \tag{6012}$$

$$\gamma + \tau = \tau + C \tag{6013}$$

$$\gamma + \tau = \tau + C \tag{6014}$$

$$\gamma + \tau = \tau + C \tag{6015}$$

$$\tag{6016}$$

4.2.45 Derivation 92

$$\zeta(\beta) = \log(\beta) \tag{6017}$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{d}{d\beta}\log(\beta) \tag{6018}$$

$$\frac{d}{d\beta}\zeta(\beta) = \frac{1}{\beta} \tag{6019}$$

$$\frac{\iint \tau \frac{d}{d\beta}\log(\beta) d\beta d\beta}{\log(\beta)} = \frac{\iint \frac{\tau}{\beta} d\beta d\beta}{\log(\beta)} \tag{6020}$$

4.2.46 Derivation 94

$$\upsilon(\beta) = \sin(e^{\beta}) \tag{6021}$$

$$\frac{d}{d\beta}\upsilon(\beta) = \frac{d}{d\beta}\sin(e^{\beta}) \tag{6022}$$

$$\frac{d}{d\beta}\upsilon(\beta) = \cos(e^{\beta})e^{\beta} \tag{6023}$$

$$\gamma(\xi) = \sin(\xi) \tag{6024}$$

$$\frac{d}{d\xi}\gamma(\xi) = \frac{d}{d\xi}\sin(\xi) \tag{6025}$$

$$\frac{d}{d\xi}\gamma(\xi) = \cos(\xi) \tag{6026}$$

$$\cos(\xi) + \frac{d}{d\beta}\upsilon(\beta) = \cos(\xi) + \frac{d}{d\beta}\sin(e^{\beta}) \tag{6027}$$

4.2.47 Derivation 95

$$o(\xi) = e^{\xi} \tag{6028}$$

$$\frac{d}{d\xi}o(\xi) = \frac{d}{d\xi}e^{\xi} \tag{6029}$$

$$\frac{d^2}{d\xi^2}o(\xi) = \frac{d^2}{d\xi^2}e^{\xi} \tag{6030}$$

$$\frac{d^2}{d\xi^2}o(\xi) = e^{\xi} \tag{6031}$$

$$\frac{d^2}{d\xi^2}o(\xi) = \frac{d^2}{d\xi^2}o(\xi) + \frac{d}{d\xi}o(\xi) \tag{6032}$$

$$2o(\xi) = o(\xi) + \frac{d^2}{d\xi^2}o(\xi) \tag{6033}$$

4.2.48 Derivation 96

$$\tau(\iota, \beta) = \frac{\beta}{\iota} \tag{6034}$$

$$\frac{\partial}{\partial\beta}\tau(\iota, \beta) = \frac{\partial}{\partial\beta}\frac{\beta}{\iota} \tag{6035}$$

$$\frac{\partial}{\partial\beta}\tau(\iota, \beta) = \frac{1}{\iota} \tag{6036}$$

$$\frac{\frac{\partial}{\partial\beta}\tau(\iota, \beta)}{\iota} = \iota^{-1-\frac{\iota\tau(\iota,\beta)}{\beta}}\frac{\partial}{\partial\beta}\tau(\iota, \beta) \tag{6037}$$

4.2.49 Derivation 98

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6038}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6039}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6040}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6041}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6042}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6043}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6044}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6045}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6046}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6047}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6048}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6049}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6050}$$

$$\frac{d}{d\kappa}\alpha(\kappa) = \frac{1}{\kappa} \tag{6051}$$

4.2.50 Derivation 99

$$\upsilon(\xi,\tau) = \tau + \xi \tag{6052}$$

$$\zeta(\xi,\tau) = (\tau+\xi)\frac{\partial}{\partial\tau}\upsilon(\xi,\tau) \tag{6053}$$

$$\frac{\partial}{\partial\tau}\upsilon(\xi,\tau) = \frac{\partial}{\partial\tau}(\tau+\xi) \tag{6054}$$

$$\frac{\partial}{\partial\tau}\upsilon(\xi,\tau) = 1 \tag{6055}$$

$$\zeta(\xi,\tau) = (\tau+\xi)\frac{\partial}{\partial\tau}(\tau+\xi)\frac{\partial}{\partial\tau}\upsilon(\xi,\tau)\frac{\partial}{\partial\tau}\upsilon(\xi,\tau) = (\tau+\xi)\frac{\partial}{\partial\tau}(\tau+\xi)\frac{\partial}{\partial\tau}(\tau+\xi)\frac{\partial}{\partial\tau}\upsilon(\xi,\tau)\frac{\partial}{\partial\tau}\upsilon(\xi,\tau) = (\tau+\xi)\frac{\partial}{\partial\tau}(\tau+\xi)\frac{\partial}{\partial} \tag{6056}$$

4.3 Perturbation: EE

4.3.1 Derivation 1

$$\frac{d}{d\mathbf{s}}\sin(\mathbf{s}) = \mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{6057}$$

$$-\sin(\mathbf{s}) = \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}(\mathbf{s}) \tag{6058}$$

$$-\sin(\mathbf{s}) = \frac{d}{d\mathbf{s}}\frac{d}{d\mathbf{s}}\sin(\mathbf{s}) \tag{6059}$$

$$-\sin(\mathbf{s}) = \frac{d^2}{d\mathbf{s}^2}\sin(\mathbf{s}) \tag{6060}$$

4.3.2 Derivation 2

$$e^{\Psi_\lambda} = \mathbb{I}(\Psi_\lambda) \tag{6061}$$

$$\Psi_\lambda + \chi + e^{\Psi_\lambda} = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{6062}$$

$$\Psi_\lambda + \chi + e^{\Psi_\lambda} = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{6063}$$

$$\Psi_\lambda + \chi + \mathbb{I}(\Psi_\lambda) = \Psi_\lambda + \int \mathbb{I}(\Psi_\lambda)d\Psi_\lambda \tag{6064}$$

4.3.3 Derivation 3

$$\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = m(\hat{x}_0, \mathbf{r}) \tag{6065}$$

$$\hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0 m(\hat{x}_0, \mathbf{r}) \tag{6066}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0 m(\hat{x}_0, \mathbf{r}) \tag{6067}$$

$$\hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) = \hat{x}_0\int(-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{6068}$$

4.3.4 Derivation 5

$$\int(\mathbf{J} + \mathbf{v})d\mathbf{J} = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6069}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6070}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6071}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6072}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6073}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6074}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6075}$$

$$\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f = \mathrm{F_c}(\mathbf{J}, \mathbf{v}) \tag{6076}$$

4.3.5 Derivation 7

$$\sin(\mathbf{p}) = \mathrm{C_d}(\mathbf{p}) \tag{6077}$$

$$\cos(\mathbf{p}) = \frac{d}{d\mathbf{p}}\mathrm{C_d}(\mathbf{p}) \tag{6078}$$

$$\int F_c\frac{d}{d\mathbf{p}}\sin(\mathbf{p})dF_c = \int F_c\cos(\mathbf{p})dF_c \tag{6079}$$

4.3.6 Derivation 8

$$-\sigma_x + \varphi = \mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) \tag{6080}$$

$$\frac{\partial}{\partial \varphi}(-\sigma_x + \varphi) = \frac{d}{d\varphi}\,\mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) \tag{6081}$$

$$\frac{\partial^2}{\partial \varphi^2}(-\sigma_x + \varphi) = \frac{d^2}{d\varphi^2}\,\mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) \tag{6082}$$

$$\frac{\partial^2}{\partial \varphi^2}\,\mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right) = 0 \tag{6083}$$

$$1 = e^0 \tag{6084}$$

$$1 = (e^{\frac{\partial^2}{\partial \varphi^2}\,\mathrm{f}_{\mathbf{p}}\left(\sigma_x, \varphi\right)})^{\sigma_x} \tag{6085}$$

4.3.7 Derivation 9

$$\frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) = \hat{p}_0(\phi, \mathbf{H}) \tag{6086}$$

$$1 = \hat{p}_0(\phi, \mathbf{H}) \tag{6087}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{6088}$$

$$-3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)+\frac{\partial^2}{\partial \phi^2}(-\mathbf{H}+\phi)-1 = -3\frac{\partial}{\partial \phi}(-\mathbf{H}+\phi)-1 \tag{6089}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = 0 \tag{6090}$$

4.3.8 Derivation 11

$$\frac{\partial}{\partial g}(\lambda + g) = \mathrm{r}_0\left(\lambda, g\right) \tag{6091}$$

$$\frac{\partial}{\partial g}\,\mathrm{r}_0\left(\lambda, g\right) = 0 \tag{6092}$$

$$0 = \frac{\partial}{\partial g}\,\mathrm{r}_0\left(\lambda, g\right) \tag{6093}$$

$$(\lambda + g)\frac{d}{d\lambda}0 = (\lambda + g)\frac{\partial}{\partial \lambda}0 \tag{6094}$$

$$(\lambda + g)\frac{d}{d\lambda}0 = (\lambda + g)\frac{\partial}{\partial \lambda}\,\mathrm{r}_0\left(\lambda, g\right) \tag{6095}$$

$$(\lambda + g)\frac{d}{d\lambda}0 = (\lambda + g)\frac{\partial^2}{\partial \lambda \partial g}\,\mathrm{r}_0\left(\lambda, g\right) \tag{6096}$$

4.3.9 Derivation 12

$$\log\left(\mathbf{g}\right) = \mathbf{B}(\mathbf{g}) \tag{6097}$$

$$\frac{1}{\mathbf{g}} = \frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) \tag{6098}$$

$$\cos\left(\frac{1}{\mathbf{g}}\right) = \cos\left(\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right)\right) \tag{6099}$$

4.3.10 Derivation 15

$$\log\left(\mathbf{B}^{\hat{H}}\right) = \mathrm{A}_2\left(\hat{H}, \mathbf{B}\right) \tag{6100}$$

$$\cos\left(y\right) = \hat{H}_\lambda(y) \tag{6101}$$

$$\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)} = \frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)} \tag{6102}$$

$$\left(\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)}\right)^y = \left(\frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)}\right)^y \tag{6103}$$

4.3.11 Derivation 17

$$\cos\left(f'\right) = \hat{X}(f') \tag{6104}$$

$$-\cos\left(f'\right) = -\hat{X}(f') \tag{6105}$$

$$\frac{d}{df'} - \cos\left(f'\right) = \frac{d}{df'} - \hat{X}(f') \tag{6106}$$

$$\frac{d^2}{d(f')^2} - \cos\left(f'\right) = \frac{d^2}{d(f')^2} - \hat{X}(f') \tag{6107}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2} - \hat{X}(f') \tag{6108}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\frac{d^2}{d(f')^2}\hat{X}(f') \tag{6109}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\frac{d^2}{d(f')^2}\hat{X}(f') \tag{6110}$$

4.3.12 Derivation 18

$$\log\left(P_e\right) = W(P_e) \tag{6111}$$

$$\frac{1}{P_e} = \frac{d}{dP_e}W(P_e) \tag{6112}$$

$$\frac{1}{P_e} = \frac{d}{dP_e}\log\left(P_e\right) \tag{6113}$$

$$\int \frac{1}{P_e}dP_e = \int \frac{d}{dP_e}\log\left(P_e\right)dP_e \tag{6114}$$

4.3.13 Derivation 19

$$\int e^{\hat{H}_l} d\hat{H}_l = \mathrm{E}_\lambda(\hat{H}_l) \tag{6115}$$

$$(A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 = 0 \tag{6116}$$

$$(A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l})^2 = 0 \tag{6117}$$

$$(A_y + e^{\hat{H}_l})(A_y - \int e^{\hat{H}_l} d\hat{H}_l + e^{\hat{H}_l})^2 = 0 \tag{6118}$$

$$(A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l} d\hat{H}_l)^2 = 0 \tag{6119}$$

4.3.14 Derivation 27

$$\int \log(x') dx' = \phi(x') \tag{6120}$$

$$\frac{\partial}{\partial x'}(n_2 + x' \log(x') - x') = \mathrm{t}_1(x', n_2) \tag{6121}$$

$$\frac{\partial}{\partial x'}(n_2 + x' \log(x') - x') = \frac{d}{dx'}\phi(x') \tag{6122}$$

$$\frac{d}{dx'}\phi(x') = \frac{\partial}{\partial x'}(n_2 + x' \log(x') - x') \tag{6123}$$

$$e^{-\frac{d}{dx'}\phi(x')}\frac{d}{dx'}\phi(x') = \mathrm{t}_1(x', n_2)e^{-\frac{d}{dx'}\phi(x')} \tag{6124}$$

4.3.15 Derivation 29

$$e^{c_0} = q(c_0) \tag{6125}$$

$$e^{c_0} + n = q(c_0) \tag{6126}$$

$$(n + e^{c_0})e^{-c_0} = e^{-c_0}\int q(c_0) dc_0 \tag{6127}$$

$$\frac{n + q(c_0)}{q(c_0)} = \frac{\int q(c_0) dc_0}{q(c_0)} \tag{6128}$$

4.3.16 Derivation 30

$$\frac{\partial}{\partial A_x}(-A_x + i) = b(A_x, i) \tag{6129}$$

$$\frac{\partial}{\partial A_x}(-A_x + i) = -(-1)^{A_x} + b^{A_x}(A_x, i) \tag{6130}$$

$$0 = -(-1)^{A_x} + b^{A_x}(A_x, i) \tag{6131}$$

$$\int 0 di = \int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} di \tag{6132}$$

4.3.17 Derivation 32

$$\sin(\dot{z}) = \mathrm{P_e}(\dot{z}) \tag{6133}$$

$$\cos(\dot{z}) = \frac{d}{d\dot{z}}\sin(\dot{z}) \tag{6134}$$

$$\cos(\dot{z}) = \frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \tag{6135}$$

$$\cos(\dot{z}) = \frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \tag{6136}$$

$$\mathrm{P_e}(\dot{z})\cos(\dot{z}) = \mathrm{P_e}(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \tag{6137}$$

$$\mathrm{P_e}(\dot{z})\cos(\dot{z}) = \mathrm{P_e}(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) \tag{6138}$$

4.3.18 Derivation 38

$$\sin(\phi_1) = J(\phi_1) \tag{6139}$$

$$\sin(\phi_1)\cos(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{6140}$$

$$\sin(\phi_1)\cos(\phi_1) = \sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{6141}$$

$$J(\phi_1)\cos(\phi_1) = J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) \tag{6142}$$

4.3.19 Derivation 39

$$\mathbf{A} + \varepsilon_0 = M(\mathbf{A}, \varepsilon_0) \tag{6143}$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int M(\mathbf{A}, \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \tag{6144}$$

$$(\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0) d\mathbf{A})^{\varepsilon_0} \tag{6145}$$

4.3.20 Derivation 41

$$e^{e^{\pi}} = \mathrm{F_x}\left(\pi\right) \tag{6146}$$

$$\mathrm{F_x}\left(\pi\right) = e^{e^{\pi}} \tag{6147}$$

$$\int \mathrm{F_x}\left(\pi\right) d\pi = \int e^{e^{\pi}} d\pi \tag{6148}$$

$$\int \mathrm{F_x}\left(\pi\right) d\pi = \mathrm{Ei}\left(e^{\pi}\right) \tag{6149}$$

$$P_g + \mathrm{Ei}\left(e^{\pi}\right) = \int \mathrm{F_x}\left(\pi\right) d\pi \tag{6150}$$

$$P_g + \mathrm{Ei}\left(e^{\pi}\right) = \int e^{e^{\pi}} d\pi \tag{6151}$$

$$\int \mathrm{F_x}\left(\pi\right) d\pi = \mathrm{Ei}\left(e^{\pi}\right) + P_g \tag{6152}$$

$$\int \mathrm{F_x}\left(\pi\right) d\pi = \mathrm{Ei}\left(e^{\pi}\right) + P_g \tag{6153}$$

$$\mathrm{Ei}\left(e^{\pi}\right) - \int \mathrm{F_x}\left(\pi\right) d\pi = 0 \tag{6154}$$

$$\mathrm{Ei}\left(e^{\pi}\right) - P_g = 0 \tag{6155}$$

$$F_g + \mathrm{Ei}\left(e^{\pi}\right) - \int \mathrm{F_x}\left(\pi\right) d\pi = 0 \tag{6156}$$

$$F_g - P_g = 0 \tag{6157}$$

4.3.21 Derivation 42

$$c\cos\left(\lambda\right) = \dot{\mathbf{r}}(\lambda, c) \tag{6158}$$

$$\cos^{\lambda}\left(\lambda\right) = \left(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c)\right)^{\lambda} \tag{6159}$$

$$\left(\frac{\partial}{\partial c} c\cos\left(\lambda\right)\right)^{\lambda} = \cos^{\lambda}\left(\lambda\right) \tag{6160}$$

4.3.22 Derivation 43

$$\cos\left(\nabla\right) = G(\nabla) \tag{6161}$$

$$\frac{d}{d\nabla}\cos\left(\nabla\right) = \frac{d}{d\nabla}G(\nabla) \tag{6162}$$

$$\varphi + \sin\left(\nabla\right) + \cos\left(\nabla\right) = \varphi + G(\nabla) + \sin\left(\nabla\right) \tag{6163}$$

$$\frac{d}{d\nabla}(\varphi + \sin\left(\nabla\right) + \cos\left(\nabla\right)) = \frac{d}{d\nabla}(\varphi + G(\nabla) + \sin\left(\nabla\right)) \tag{6164}$$

$$-G(\nabla) + \int (\varphi + \sin\left(\nabla\right) + \cos\left(\nabla\right)) d\nabla - \int \cos\left(\nabla\right) d\nabla = -G(\nabla) \tag{6165}$$

4.3.23 Derivation 44

$$\frac{\partial}{\partial f^*}(\pi + f^*) = \nabla(f^*, \pi) \tag{6166}$$

$$f^* = f^*\nabla(f^*, \pi) \tag{6167}$$

$$f^*\frac{\partial}{\partial f^*}(\pi + f^*) = f^* f^*\nabla(f^*, \pi) \tag{6168}$$

$$f^*\frac{\partial}{\partial f^*}(\pi + f^*) = f^*\nabla(f^*, \pi) \tag{6169}$$

$$f^*\frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} = f^*\nabla(f^*, \pi) + (f^*)^{f^*} \tag{6170}$$

$$f^*\frac{\partial}{\partial f^*}(\pi + f^*) + (f^*)^{f^*} = f^*\frac{\partial}{\partial f^*}(\pi + f^*) + \left(f^*\frac{\partial}{\partial f^*}(\pi + f^*)\right)^{f^*} \tag{6171}$$

4.3.24 Derivation 48

$$\int \log\left(\omega\right) d\omega = \mathrm{a}^{\dagger}\left(\omega\right) \tag{6172}$$

$$\frac{d}{d\rho}\int \log\left(\omega\right) d\omega = \frac{d}{d\rho}\mathrm{a}^{\dagger}\left(\omega\right) \tag{6173}$$

$$\frac{d}{d\rho}\int \log\left(\omega\right) d\omega = \frac{\partial}{\partial\rho}\mathrm{a}^{\dagger}\left(\omega\right) \tag{6174}$$

$$\omega\log\left(\omega\right) - \omega + \rho = \mathrm{a}^{\dagger}\left(\omega\right) \tag{6175}$$

$$\frac{d}{d\rho}(\omega\log\left(\omega\right) - \omega)^{\omega} = \frac{\partial}{\partial\rho}(-\rho + \mathrm{a}^{\dagger}\left(\omega\right))^{\omega} \tag{6176}$$

4.3.25 Derivation 51

$$\log\left(\mathbf{s}\right) = \mathrm{y}'\left(\mathbf{s}\right) \tag{6177}$$

$$\mathrm{y}'\left(\mathbf{s}\right) - \int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} = a(\mathbf{s}) \tag{6178}$$

$$\mathbf{s}\log\left(\mathbf{s}\right) - \mathbf{s} + \omega = \int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} \tag{6179}$$

$$\mathbf{s}\log\left(\mathbf{s}\right) - \mathbf{s} + \omega = \int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} \tag{6180}$$

$$-\mathbf{s}\log\left(\mathbf{s}\right) + \mathbf{s} - \omega + \mathrm{y}'\left(\mathbf{s}\right) = a(\mathbf{s}) \tag{6181}$$

4.3.26 Derivation 52

$$\hat{X}^{t} = \mathrm{v_t}\left(t, \hat{X}\right) \tag{6182}$$

$$\hat{X} + \hat{X}^{t}\log\left(\hat{X}\right) = \hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}\left(t, \hat{X}\right) \tag{6183}$$

$$\hat{X} + \hat{X}^{t}\log\left(\hat{X}\right) = \hat{X} + \frac{\partial}{\partial t}\hat{X}^{t} \tag{6184}$$

4.3.27 Derivation 53

$$e^{A} = \mathrm{A_y}\left(A\right) \tag{6185}$$

$$(e^{A})^{A} = (\frac{d}{dA}\mathrm{A_y}\left(A\right))^{A} \tag{6186}$$

$$\mathrm{A_y}^{A}\left(A\right) = (\frac{d}{dA}\mathrm{A_y}\left(A\right))^{A} \tag{6187}$$

4.3.28 Derivation 54

$$\frac{r_0}{\mathbf{P}} = E(r_0, \mathbf{P}) \tag{6188}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} \tag{6189}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} \tag{6190}$$

$$\frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = \frac{r_0}{\mathbf{P}^3} \tag{6191}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{6192}$$

$$-\frac{2r_0}{\mathbf{P}^3} = \frac{\frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} \tag{6193}$$

4.3.29 Derivation 56

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6194}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6195}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6196}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6197}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6198}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6199}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6200}$$

$$\sin\left(\psi^{*}\right) + \cos\left(\psi^{*}\right) = C(\psi^{*}) + \frac{d}{d\psi^{*}}C(\psi^{*}) \tag{6201}$$

4.3.30 Derivation 58

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6202}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6203}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6204}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6205}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6206}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6207}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6208}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6209}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6210}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6211}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6212}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6213}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6214}$$

$$\frac{1}{t_2} = \mathrm{E_x}\left(t_2\right) \tag{6215}$$

4.3.31 Derivation 61

$$\frac{\partial}{\partial s}(\mathbf{M} + s) = q(\mathbf{M}, s) \tag{6216}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = 0 \tag{6217}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = \frac{\partial}{\partial s}q(\mathbf{M}, s) \tag{6218}$$

$$\frac{\partial^2}{\partial s^2}(\mathbf{M} + s) = 0 \tag{6219}$$

$$0 = \frac{\partial^2}{\partial s^2}(\mathbf{M} + s) \tag{6220}$$

4.3.32 Derivation 67

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6221}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6222}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6223}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6224}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6225}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6226}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6227}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6228}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6229}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} - 1 = l(\varphi^*) - 1 \tag{6230}$$

$$\frac{d^2}{d(\varphi^*)^2}e^{\varphi^*} \tag{6231}$$

4.3.33 Derivation 69

$$\sin\left(C_2\right) = \hat{\mathbf{x}}(C_2) \tag{6232}$$

$$\varepsilon + \sin\left(C_2\right) = c + \hat{\mathbf{x}}(C_2) \tag{6233}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + \sin\left(C_2\right)) = \frac{\partial}{\partial C_2}(c + \hat{\mathbf{x}}(C_2)) \tag{6234}$$

$$\frac{\partial}{\partial C_2}(2\varepsilon + 2\sin\left(C_2\right)) = \frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin\left(C_2\right)) \tag{6235}$$

4.3.34 Derivation 71

$$G - L = \mathrm{v_x}\left(G, L\right) \tag{6236}$$

$$1 = \frac{\partial}{\partial G}\,\mathrm{v_x}\left(G, L\right) \tag{6237}$$

$$1 = (((\frac{\partial}{\partial G}\,\mathrm{v_x}\left(G, L\right))^G)^G)^G \tag{6238}$$

4.3.35 Derivation 74

$$s(\mathbf{J}_P + \rho_b) = \Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{6239}$$

$$\frac{s(\mathbf{J}_P + \rho_b)}{\mathbf{J}_P} = \frac{\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{6240}$$

$$\frac{\partial}{\partial s}\frac{s(\mathbf{J}_P + \rho_b)}{\mathbf{J}_P} = \frac{\partial}{\partial s}\frac{\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{6241}$$

$$\frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{6242}$$

$$\frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P} = \frac{\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s)}{\mathbf{J}_P} \tag{6243}$$

4.3.36 Derivation 76

$$\sin(\hat{X}) = r(\hat{X}) \tag{6244}$$

$$\cos(\hat{X}) = \frac{d}{d\hat{X}}r(\hat{X}) \tag{6245}$$

$$-\sin(\hat{X}) = \frac{d}{d\hat{X}}\cos(\hat{X}) \tag{6246}$$

$$-\sin(\hat{X}) = \frac{d}{d\hat{X}}\frac{d}{d\hat{X}}r(\hat{X}) \tag{6247}$$

$$-\sin(\hat{X}) = \frac{d^2}{d\hat{X}^2}r(\hat{X}) \tag{6248}$$

4.3.37 Derivation 77

$$e^{\sin(\dot{z})} = A(\dot{z}) \tag{6249}$$

$$\cos(\dot{z}) = \frac{d}{d\dot{z}}\sin(\dot{z}) \tag{6250}$$

$$e^{\sin(\dot{z})}\cos(\dot{z}) = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6251}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6252}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6253}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6254}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6255}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6256}$$

$$\frac{d}{d\dot{z}}e^{\sin(\dot{z})} = \frac{d}{d\dot{z}}A(\dot{z}) \tag{6257}$$

$$\tag{6258}$$

4.3.38 Derivation 78

$$\cos(L_\varepsilon) = \dot{z}(L_\varepsilon) \tag{6259}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \dot{z}(L_\varepsilon)dL_\varepsilon + 1 \tag{6260}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int (\cos(L_\varepsilon) + 1)dL_\varepsilon + 1 \tag{6261}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + \int 1dL_\varepsilon + 1 \tag{6262}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + L_\varepsilon + 1 \tag{6263}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + L_\varepsilon + 1 \tag{6264}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + L_\varepsilon + 1 \tag{6265}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + L_\varepsilon + 1 \tag{6266}$$

$$\pi + \sin(L_\varepsilon) + 1 = \int \cos(L_\varepsilon)dL_\varepsilon + L_\varepsilon + 1 \tag{6267}$$

$$\pi + \sin(L_\varepsilon) \tag{6268}$$

4.3.39 Derivation 79

$$\sin(\varepsilon_0) = \mathrm{f}'(\varepsilon_0) \tag{6269}$$

$$\cos(\varepsilon_0) = \frac{d}{d\varepsilon_0}\sin(\varepsilon_0) \tag{6270}$$

$$\cos(\varepsilon_0) = \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{6271}$$

$$\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) = 0 \tag{6272}$$

$$\int (\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0))d\varepsilon_0 = \int 0d\varepsilon_0 \tag{6273}$$

4.3.40 Derivation 84

$$\int e^Z dZ = \mathbf{S}(Z) \tag{6274}$$

$$\hat{H}_\lambda + e^Z = \mathbf{S}(Z) \tag{6275}$$

$$(\phi + e^Z)e^Z = (\hat{H}_\lambda + e^Z)e^Z \tag{6276}$$

$$e^{(e^Z \int e^Z dZ)^\phi} = e^{((\phi+e^Z)e^Z)^\phi} \tag{6277}$$

4.3.41 Derivation 85

$$e^\varepsilon = \mathrm{A_x}(\varepsilon) \tag{6278}$$

$$\frac{d}{d\varepsilon}e^\varepsilon = \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6279}$$

$$\frac{d}{d\varepsilon}e^\varepsilon = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6280}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6281}$$

$$\varepsilon + \frac{d^2}{d\varepsilon^2}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6282}$$

4.3.42 Derivation 87

$$\int(\eta + g)dg = \mathrm{r_0}(\eta, g) \tag{6283}$$

$$\int(\eta + g)dg = \eta g + \sigma_p + \frac{g^2}{2} \tag{6284}$$

$$\eta g + \sigma_p + \frac{g^2}{2} = \mathrm{r_0}(\eta, g) \tag{6285}$$

$$2\eta g + 2\sigma_p + g^2 = \eta g + \sigma_p + \frac{g^2}{2} + \int(\eta + g)dg \tag{6286}$$

4.3.43 Derivation 89

$$\sin(\phi) = \mathrm{g}'_\varepsilon(\phi) \tag{6287}$$

$$0 = -\cos(\phi) + \frac{d}{d\phi}\sin(\phi) \tag{6288}$$

$$0 = -\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_\varepsilon(\phi) \tag{6289}$$

$$\frac{0^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} = \frac{(-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_\varepsilon(\phi))^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} \tag{6290}$$

4.3.44 Derivation 90

$$e^\mu = \omega(\mu) \tag{6291}$$

$$\int \frac{e^\mu}{\omega(\mu)}d\mu = \mathbf{J} + \mu \tag{6292}$$

$$\int \frac{e^\mu}{\omega(\mu)}d\mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{6293}$$

4.3.45 Derivation 92

$$\log(q) = \mathbf{J}(q) \tag{6294}$$

$$\frac{1}{q} = \frac{d}{dq}\log(q) \tag{6295}$$

$$\frac{1}{q} = \frac{d}{dq}\mathbf{J}(q) \tag{6296}$$

$$\frac{\iint \frac{\mathbf{v}}{q}dqdq}{\log(q)} = \frac{\iint \mathbf{v}\frac{d}{dq}\log(q)dqdq}{\log(q)} \tag{6297}$$

4.3.46 Derivation 94

$$\sin(e^{E_x}) = \mathbf{p}(E_x) \tag{6298}$$

$$\sin(U) = \dot{y}(U) \tag{6299}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6300}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6301}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6302}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6303}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6304}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6305}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6306}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6307}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6308}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6309}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6310}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6311}$$

$$\cos(U) = \frac{d}{dU}\sin(U) \tag{6312}$$

$$\cos(U) = \frac{d}{dU}\dot{y}(U) \tag{6313}$$

$$\cos(U) = \frac{d}{dU} \tag{6314}$$

4.3.47 Derivation 95

$$e^L = \mathrm{v_y}(L) \tag{6315}$$

$$e^L = \frac{d}{dL}\mathrm{v_y}(L) \tag{6316}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6317}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6318}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6319}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6320}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6321}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6322}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6323}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6324}$$

$$e^L = \frac{d}{dL}\frac{d}{dL}\mathrm{v_y}(L) \tag{6325}$$

4.3.48 Derivation 96

$$\frac{h}{\mathbf{s}} = \psi(\mathbf{s}, h) \tag{6326}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6327}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6328}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6329}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6330}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6331}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6332}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6333}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6334}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6335}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6336}$$

$$\frac{1}{\mathbf{s}} = \frac{\partial}{\partial h}\psi(\mathbf{s}, h) \tag{6337}$$

$$\frac{1}{\mathbf{s}} \tag{6338}$$

4.3.49 Derivation 98

$$\log(\delta) = \Psi(\delta) \tag{6339}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\Psi(\delta) \tag{6340}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\log(\delta) \tag{6341}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\Psi(\delta) \tag{6342}$$

$$\frac{1}{\delta} = \frac{d}{d\delta}\log(\delta) \tag{6343}$$

$$\frac{(\frac{d}{d\delta}\Psi(\delta))^{-\delta}}{\delta} = (\frac{d}{d\delta}\Psi(\delta))^{-\delta}\frac{d}{d\delta}\log(\delta) \tag{6344}$$

4.3.50 Derivation 99

$$G + \Omega = \mathbf{S}(G, \Omega) \tag{6345}$$

$$(G + \Omega)\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) \tag{6346}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right)}{(G + \Omega)} \tag{6347}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right)}{(G + \Omega)} \tag{6348}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right)}{(G + \Omega)} \tag{6349}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right)}{(G + \Omega)} \tag{6350}$$

$$\frac{\partial}{\partial \Omega}\mathbf{S}(G, \Omega) = \frac{\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right)}{(G + \Omega)} \tag{6351}$$

4.4 Perturbation: AG

4.4.1 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{6352}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}}\frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{6353}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \frac{d}{d\mathbf{s}}\cos\left(\mathbf{s}\right) \tag{6354}$$

$$\frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = -\sin\left(\mathbf{s}\right) \tag{6355}$$

$$\mathbf{s} + \frac{d}{d\mathbf{s}}\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) = \mathbf{s} - \sin\left(\mathbf{s}\right) \tag{6356}$$

4.4.2 Derivation 2

$$\mathbb{I}(\Psi_{\lambda}) = e^{\Psi_{\lambda}} \tag{6357}$$

$$\Psi_{\lambda} + \int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \Psi_{\lambda} + \chi + e^{\Psi_{\lambda}} \tag{6358}$$

$$\Psi_{\lambda} + \int \mathbb{I}(\Psi_{\lambda})d\Psi_{\lambda} = \Psi_{\lambda} + \chi + e^{\Psi_{\lambda}} \tag{6359}$$

$$\Psi_{\lambda} + \int e^{\Psi_{\lambda}}d\Psi_{\lambda} = \Psi_{\lambda} + \chi + e^{\Psi_{\lambda}} \tag{6360}$$

4.4.3 Derivation 3

$$m(\hat{x}_0, \mathbf{r}) = \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{6361}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 \tag{6362}$$

$$\hat{x}_0 m(\hat{x}_0, \mathbf{r}) = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{6363}$$

$$\hat{x}_0 \int (-\hat{x}_0 + \mathbf{r})d\hat{x}_0 = \hat{x}_0(\hat{H} - \frac{\hat{x}_0^2}{2} + \hat{x}_0\mathbf{r}) \tag{6364}$$

4.4.4 Derivation 5

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \int (\mathbf{J} + \mathbf{v})d\mathbf{J} \tag{6365}$$

$$\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right) = \frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f \tag{6366}$$

$$\frac{2\,\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right)}{\mathbf{J}^2(\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f)} = \frac{2}{\mathbf{J}^2} \tag{6367}$$

$$\frac{2\,\mathrm{F_c}\left(\mathbf{J}, \mathbf{v}\right)}{\mathbf{J}^2(\frac{\mathbf{J}^2}{2} + \mathbf{J}\mathbf{v} + f)} = \frac{2}{\mathbf{J}^2} \tag{6368}$$

4.4.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right) = \sin\left(\mathbf{p}\right) \tag{6369}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{6370}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{6371}$$

$$\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) = \cos\left(\mathbf{p}\right) \tag{6372}$$

4.4.6 Derivation 8

$$\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -\sigma_x + \varphi \tag{6373}$$

$$\frac{\partial}{\partial \varphi}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = -1 \tag{6374}$$

$$\frac{\partial^2}{\partial \varphi^2}\mathrm{f_{\mathbf{p}}}\left(\sigma_x, \varphi\right) = 0 \tag{6375}$$

$$e^{\frac{\partial^2}{\partial \varphi^2}(-\sigma_x + \varphi)} = e^0 \tag{6376}$$

$$e^{\frac{\partial^2}{\partial \varphi^2}(-\sigma_x + \varphi)} = 1 \tag{6377}$$

4.4.7 Derivation 9

$$\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}(-\mathbf{H} + \phi) \tag{6378}$$

$$\hat{p}_0(\phi, \mathbf{H}) = 1 \tag{6379}$$

$$\frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) = \frac{\partial}{\partial \phi}1 \tag{6380}$$

$$0 = \frac{\partial}{\partial \phi}\hat{p}_0(\phi, \mathbf{H}) \tag{6381}$$

$$0^{\mathbf{H}} = (\frac{\partial^2}{\partial \phi^2}(-\mathbf{H} + \phi))^{\mathbf{H}} \tag{6382}$$

4.4.8 Derivation 11

$$\mathrm{r}_0\left(\lambda, g\right) = \frac{\partial}{\partial g}(\lambda + g) \tag{6383}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0\left(\lambda, g\right) = \frac{\partial}{\partial g}\frac{\partial}{\partial g}(\lambda + g) \tag{6384}$$

$$\frac{\partial}{\partial g}\mathrm{r}_0\left(\lambda, g\right) = 0 \tag{6385}$$

$$\frac{\partial^2}{\partial g \partial \lambda}\mathrm{r}_0\left(\lambda, g\right) = 0 \tag{6386}$$

4.4.9 Derivation 12

$$\mathbf{B}(\mathbf{g}) = \log\left(\mathbf{g}\right) \tag{6387}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{6388}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g}) = \frac{1}{\mathbf{g}} \tag{6389}$$

$$\frac{d}{d\mathbf{g}}\cos\left(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})\right) = \frac{d}{d\mathbf{g}}\cos\left(\frac{1}{\mathbf{g}}\right) \tag{6390}$$

4.4.10 Derivation 15

$$\mathrm{A}_2\left(\hat{H}, \mathbf{B}\right) = \log\left(\mathbf{B}^{\hat{H}}\right) \tag{6391}$$

$$\hat{H}_\lambda(y) = \cos\left(y\right) \tag{6392}$$

$$\frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)} = \frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)} \tag{6393}$$

$$\left(\frac{\hat{H}_\lambda(y)}{\log\left(\mathbf{B}\right)}\right)^{\mathbf{B}} = \left(\frac{\cos\left(y\right)}{\log\left(\mathbf{B}\right)}\right)^{\mathbf{B}} \tag{6394}$$

4.4.11 Derivation 17

$$\hat{X}(f') = \cos\left(f'\right) \tag{6395}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos\left(f'\right) \tag{6396}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos\left(f'\right) \tag{6397}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = -\cos\left(f'\right) \tag{6398}$$

$$\frac{d^2}{d(f')^2}\cos\left(f'\right) = -\cos\left(f'\right) \tag{6399}$$

4.4.12 Derivation 18

$$W(P_e) = \log\left(P_e\right) \tag{6400}$$

$$\frac{d}{dP_e}W(P_e) = \frac{d}{dP_e}\log\left(P_e\right) \tag{6401}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{6402}$$

$$\frac{d}{dP_e}W(P_e) = \frac{1}{P_e} \tag{6403}$$

$$-P_e + \frac{d}{dP_e}\log\left(P_e\right) = -P_e + \frac{1}{P_e} \tag{6404}$$

$$-P_e + \frac{d}{dP_e}\log\left(P_e\right) = -P_e + \frac{1}{P_e} \tag{6405}$$

$$\frac{d}{dP_e}\log\left(P_e\right) = \frac{1}{P_e} \tag{6406}$$

$$\frac{d}{dP_e}\log\left(P_e\right) = \frac{1}{P_e} \tag{6407}$$

4.4.13 Derivation 19

$$\mathrm{E}_\lambda\left(\hat{H}_l\right) = \int e^{\hat{H}_l} d\hat{H}_l \tag{6408}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l}) \tag{6409}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l}) \tag{6410}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda\left(\hat{H}_l\right) + e^{\hat{H}_l}) \tag{6411}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l}) \quad (6412)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l}) \quad (6413)$$

$$0 = (A_y + e^{\hat{H}_l})(A_y - \mathrm{E}_\lambda(\hat{H}_l) + e^{\hat{H}_l}) \quad (6414)$$

4.4.14 Derivation 27

$$\phi(x') = \int \log(x')dx' \quad (6415)$$

$$\frac{d}{dx'}\phi(x') = \frac{d}{dx'}\int \log(x')dx' \quad (6416)$$

$$\frac{d}{dx'}\phi(x') = \int \frac{\partial}{\partial x'}\log(x')dx' \quad (6417)$$

$$\frac{d}{dx'}\phi(x') = \int \frac{1}{x'}dx' \quad (6418)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6419)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6420)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6421)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6422)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6423)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6424)$$

$$\frac{d}{dx'}\phi(x') = \log(x') + C \quad (6425)$$

$$\frac{d}{dx'}\phi \quad (6426)$$

4.4.15 Derivation 29

$$q(c_0) = e^{c_0} \quad (6427)$$

$$e^{-c_0}\int q(c_0)dc_0 = e^{-c_0}\int e^{c_0}dc_0 \quad (6428)$$

$$e^{-c_0}\int q(c_0)dc_0 = (n + e^{c_0})e^{-c_0} \quad (6429)$$

$$e^{-c_0} = \frac{(n + e^{c_0})e^{-c_0}}{\int q(c_0)dc_0} \quad (6430)$$

4.4.16 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \quad (6431)$$

$$-(-1)^{A_x} + b^{A_x}(A_x, i) = 0 \quad (6432)$$

$$\frac{-(-1)^{A_x} + (\frac{\partial}{\partial A_x}(-A_x + i))^{A_x}}{i} = 0 \quad (6433)$$

4.4.17 Derivation 32

$$\mathrm{P_e}(\dot{z}) = \sin(\dot{z}) \quad (6434)$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \frac{d}{d\dot{z}}\sin(\dot{z}) \quad (6435)$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \cos(\dot{z}) \quad (6436)$$

$$\frac{\sin(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z})}{\mathrm{P_e}(\dot{z})} = \frac{\sin(\dot{z})\cos(\dot{z})}{\mathrm{P_e}(\dot{z})} \quad (6437)$$

4.4.18 Derivation 38

$$J(\phi_1) = \sin(\phi_1) \quad (6438)$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) \quad (6439)$$

$$\sin(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) \quad (6440)$$

$$\sin(\phi_1)\frac{d}{d\phi_1}\sin(\phi_1) - \frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) - \frac{d}{d\phi_1}J(\phi_1) \quad (6441)$$

4.4.19 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \quad (6442)$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \quad (6443)$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \quad (6444)$$

$$(\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \quad (6445)$$

4.4.20 Derivation 41

$$\mathrm{F_x}\,(\pi) = e^{e^{\pi}} \tag{6446}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6447}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6448}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6449}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6450}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6451}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6452}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6453}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6454}$$

$$\int \mathrm{F_x}\,(\pi) d\pi = P_g + \mathrm{Ei}\,(e^{\pi}) \tag{6455}$$

4.4.21 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c\cos{(\lambda)} \tag{6456}$$

$$\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c) = \frac{\partial}{\partial c}c\cos{(\lambda)} \tag{6457}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} = (\frac{\partial}{\partial c}c\cos{(\lambda)})^{\lambda} \tag{6458}$$

$$(\frac{\partial}{\partial c}\dot{\mathbf{r}}(\lambda, c))^{\lambda} = \cos^{\lambda}{(\lambda)} \tag{6459}$$

$$(\frac{\partial}{\partial c}c\cos{(\lambda)})^{\lambda} = \cos^{\lambda}{(\lambda)} \tag{6460}$$

4.4.22 Derivation 43

$$G(\nabla) = \cos{(\nabla)} \tag{6461}$$

$$\varphi + G(\nabla) + \sin{(\nabla)} = \varphi + \sin{(\nabla)} + \cos{(\nabla)} \tag{6462}$$

$$\frac{\int(\varphi + G(\nabla) + \sin{(\nabla)})d\nabla}{\varphi + G(\nabla) + \sin{(\nabla)}} = \frac{\int(\varphi + \sin{(\nabla)} + \cos{(\nabla)})d\nabla}{\varphi + G(\nabla) + \sin{(\nabla)}} \tag{6463}$$

4.4.23 Derivation 44

$$\nabla(f^{*}, \pi) = \frac{\partial}{\partial f^{*}}(\pi + f^{*}) \tag{6464}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6465}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6466}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6467}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6468}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6469}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6470}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6471}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6472}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6473}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6474}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6475}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6476}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6477}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6478}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6479}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6480}$$

$$f^{*}\nabla(f^{*}, \pi) = f^{*} \tag{6481}$$

4.4.24 Derivation 48

$$\mathrm{a}^{\dagger}\left(\omega\right) = \int \log\left(\omega\right) d\omega \tag{6482}$$

$$\mathrm{a}^{\dagger}\left(\omega\right) = \omega \log\left(\omega\right) - \omega + \rho \tag{6483}$$

$$\rho + (-\rho + \mathrm{a}^{\dagger}\left(\omega\right))^{\omega} - \mathrm{a}^{\dagger}\left(\omega\right) = \rho + (\omega \log\left(\omega\right) - \omega)^{\omega} - \mathrm{a}^{\dagger}\left(\omega\right) \tag{6484}$$

4.4.25 Derivation 51

$$\mathrm{y}'\left(\mathbf{s}\right) = \log\left(\mathbf{s}\right) \tag{6485}$$

$$\int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} = \int \log\left(\mathbf{s}\right) d\mathbf{s} \tag{6486}$$

$$\int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} = \mathbf{s}\log\left(\mathbf{s}\right) - \mathbf{s} + \omega \tag{6487}$$

$$a(\mathbf{s}) = \mathrm{y}'\left(\mathbf{s}\right) - \int \mathrm{y}'\left(\mathbf{s}\right) d\mathbf{s} \tag{6488}$$

$$a(\mathbf{s}) = \mathrm{y}'\left(\mathbf{s}\right) - \int \log\left(\mathbf{s}\right) d\mathbf{s} \tag{6489}$$

4.4.26 Derivation 52

$$\mathrm{v_t}\left(t, \hat{X}\right) = \hat{X}^{t} \tag{6490}$$

$$\frac{\partial}{\partial t}\mathrm{v_t}\left(t, \hat{X}\right) = \frac{\partial}{\partial t}\hat{X}^{t} \tag{6491}$$

$$\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}\left(t, \hat{X}\right) = \hat{X} + \hat{X}^{t}\log\left(\hat{X}\right) \tag{6492}$$

$$(\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}\left(t, \hat{X}\right))^{t} = (\hat{X} + \hat{X}^{t}\log\left(\hat{X}\right))^{t} \tag{6493}$$

$$(\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}\left(t, \hat{X}\right))^{t} = (\hat{X} + \mathrm{v_t}\left(t, \hat{X}\right)\log\left(\hat{X}\right))^{t} \tag{6494}$$

4.4.27 Derivation 53

$$\mathrm{A_y}\left(A\right) = e^{A} \tag{6495}$$

$$(\frac{d}{dA}\mathrm{A_y}\left(A\right))^{A} = (e^{A})^{A} \tag{6496}$$

$$\frac{(\frac{d}{dA}e^{A})^{A}}{\frac{d}{dA}\mathrm{A_y}\left(A\right)} = \frac{(e^{A})^{A}}{\frac{d}{dA}\mathrm{A_y}\left(A\right)} \tag{6497}$$

4.4.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{6498}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}}\frac{r_0}{\mathbf{P}} \tag{6499}$$

$$\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}^2} \tag{6500}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} = \frac{r_0}{\mathbf{P}^3} \tag{6501}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2r_0}{\mathbf{P}^3} \tag{6502}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}}E(r_0, \mathbf{P})}{\mathbf{P}} - \frac{E(r_0, \mathbf{P})}{\mathbf{P}^2} = -\frac{2E(r_0, \mathbf{P})}{\mathbf{P}^2} \tag{6503}$$

4.4.29 Derivation 56

$$C(\psi^*) = \sin\left(\psi^*\right) \tag{6504}$$

$$\frac{d}{d\psi^*}C(\psi^*) = \cos\left(\psi^*\right) \tag{6505}$$

$$1 = \frac{\sin\left(\psi^*\right) + \frac{d}{d\psi^*}C(\psi^*)}{C(\psi^*) + \frac{d}{d\psi^*}C(\psi^*)} \tag{6506}$$

4.4.30 Derivation 58

$$\mathrm{E_x}\left(t_2\right) = \frac{1}{t_2} \tag{6507}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = \int \frac{1}{t_2} dt_2 \tag{6508}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(t_2\right) \tag{6509}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right) \tag{6510}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right) \tag{6511}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right) \tag{6512}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right) \tag{6513}$$

$$\int \mathrm{E_x}\left(t_2\right) dt_2 = C_1 + \log\left(\frac{1}{\mathrm{E_x}\left(t_2\right)}\right) \tag{6514}$$

$$\int \mathrm{E_x}\left(t_2\right) \tag{6515}$$

4.4.31 Derivation 61

$$q(\mathbf{M}, s) = \frac{\partial}{\partial s}(\mathbf{M} + s) \tag{6516}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}(\mathbf{M} + s) \tag{6517}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + \frac{\partial}{\partial s}\frac{\partial}{\partial s}s \tag{6518}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + \frac{\partial}{\partial s}\frac{\partial}{\partial s}s \tag{6519}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} + \frac{\partial}{\partial s}0 \tag{6520}$$

$$\frac{\partial}{\partial s}q(\mathbf{M}, s) = \frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M} \tag{6521}$$

$$(\frac{\partial}{\partial s}q(\mathbf{M}, s))^{\mathbf{M}} = (\frac{\partial}{\partial s}\frac{\partial}{\partial s}\mathbf{M})^{\mathbf{M}} \tag{6522}$$

$$(\frac{\partial}{\partial s}q(\mathbf{M}, s)) \tag{6523}$$

4.4.32 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*}e^{\varphi^*} \tag{6524}$$

$$l(\varphi^*) = e^{\varphi^*} \tag{6525}$$

$$e^{\varphi^*} + 1 = \frac{d}{d\varphi^*}e^{\varphi^*} + 1 \tag{6526}$$

4.4.33 Derivation 69

$$\hat{\mathbf{x}}(C_2) = \sin{(C_2)} \tag{6527}$$

$$c + \hat{\mathbf{x}}(C_2) = \varepsilon + \sin{(C_2)} \tag{6528}$$

$$(2\varepsilon{+}2\sin{(C_2)})(\varepsilon{+}c{+}2\sin{(C_2)}) = (2\varepsilon{+}2\sin{(C_2)})^2 \tag{6529}$$

4.4.34 Derivation 71

$$\mathrm{v_x}\,(G, L) = G - L \tag{6530}$$

$$\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = \frac{\partial}{\partial G}(G - L) \tag{6531}$$

$$\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = 1 \tag{6532}$$

$$((\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L))^G)^G{+}\frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L) = \frac{\partial}{\partial G}\,\mathrm{v_x}\,(G, L){+}1 \tag{6533}$$

4.4.35 Derivation 74

$$, thenderive\frac{\partial}{\partial \mathbf{J}_P}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = s, thenobtain\int\frac{\partial}{\partial \mathbf{J}_P}\Psi_{nl}(\rho_b \tag{6534}$$

4.4.36 Derivation 76

$$r(\hat{X}) = \sin{(\hat{X})} \tag{6535}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \frac{d}{d\hat{X}}\sin{(\hat{X})} \tag{6536}$$

$$\frac{d}{d\hat{X}}r(\hat{X}) = \cos{(\hat{X})} \tag{6537}$$

$$\frac{d^2}{d\hat{X}^2}\sin{(\hat{X})} = \frac{d}{d\hat{X}}\cos{(\hat{X})} \tag{6538}$$

4.4.37 Derivation 77

$$A(\dot{z}) = e^{\sin{(\dot{z})}} \tag{6539}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = \frac{d}{d\dot{z}}e^{\sin{(\dot{z})}} \tag{6540}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{6541}$$

$$e^{-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z})} = e^{A(\dot{z})\cos{(\dot{z})} - A(\dot{z})} \tag{6542}$$

4.4.38 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{6543}$$

$$\int\dot{z}(L_\varepsilon)dL_\varepsilon = \int\cos{(L_\varepsilon)}dL_\varepsilon \tag{6544}$$

$$\int\dot{z}(L_\varepsilon)dL_\varepsilon = \sin{(L_\varepsilon)} + C \tag{6545}$$

$$\int\dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \sin{(L_\varepsilon)} + 1 \tag{6546}$$

$$\int\dot{z}(L_\varepsilon)dL_\varepsilon + 1 = \pi + \sin{(L_\varepsilon)} + 1 \tag{6547}$$

$$(g_\varepsilon{+}\sin{(L_\varepsilon)}{+}1)^\pi = (\pi{+}\sin{(L_\varepsilon)}{+}1)^\pi \tag{6548}$$

4.4.39 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{6549}$$

$$0 = \mathrm{f}'(\varepsilon_0) - \sin(\varepsilon_0) \tag{6550}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0) \tag{6551}$$

$$0 = \cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\sin(\varepsilon_0) \tag{6552}$$

4.4.40 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{6553}$$

$$\mathbf{S}(Z) = \hat{H}_\lambda + e^Z \tag{6554}$$

$$(\hat{H}_\lambda + e^Z)e^Z = (\phi + e^Z)e^Z \tag{6555}$$

$$((\phi + e^Z)e^Z)^\phi = (\mathbf{S}(Z)e^Z)^\phi \tag{6556}$$

4.4.41 Derivation 85

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6557}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6558}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6559}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6560}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6561}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6562}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6563}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6564}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6565}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6566}$$

$$\frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \mathrm{A_x}(\varepsilon) \tag{6567}$$

4.4.42 Derivation 87

$$\mathrm{r}_0(\eta, g) = \int (\eta + g) dg \tag{6568}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \frac{d}{dg}\int (\eta + g) dg \tag{6569}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \frac{d}{dg}(\eta g + \sigma_p + \frac{g^2}{2}) \tag{6570}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \eta + \frac{d}{dg}(\sigma_p + \frac{g^2}{2}) \tag{6571}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \eta + \frac{d}{dg}\sigma_p + \frac{d}{dg}\frac{g^2}{2} \tag{6572}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \eta + \frac{d}{dg}\sigma_p + \frac{g}{2} \tag{6573}$$

$$\frac{d}{dg}\mathrm{r}_0(\eta, g) = \eta + \frac{d}{dg}\sigma_p + \frac{g}{2} \tag{6574}$$

4.4.43 Derivation 89

$$\mathrm{g}'_\varepsilon(\phi) = \sin(\phi) \tag{6575}$$

$$-\mathrm{g}'_\varepsilon(\phi) = -\sin(\phi) \tag{6576}$$

$$\frac{d}{d\phi}\mathrm{g}'_\varepsilon(\phi) = \frac{d}{d\phi}\sin(\phi) \tag{6577}$$

$$-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_\varepsilon(\phi) = 0 \tag{6578}$$

$$\cos((-\cos(\phi) + \frac{d}{d\phi}\mathrm{g}'_\varepsilon(\phi))^\phi) = \cos(0^\phi) \tag{6579}$$

4.4.44 Derivation 90

$$\omega(\mu) = e^\mu \tag{6580}$$

$$\frac{1}{\omega(\mu)} = e^{-\mu} \tag{6581}$$

$$\mathbf{J} + \mu = \int \frac{e^\mu}{\omega(\mu)} d\mu \tag{6582}$$

$$\mathbf{J} + \mu = \int \frac{e^\mu}{e^\mu} d\mu \tag{6583}$$

$$\mathbf{J} + \mu = \int d\mu \tag{6584}$$

$$\mathbf{J} + \mu = \mu + \mathbf{J} \tag{6585}$$

$$\mathbf{J} + \mu = \mu + \mathbf{J} \tag{6586}$$

$$(\mathbf{J}+\mu)(\mathbf{J}+\mu-\frac{1}{\omega(\mu)}) = (\mathbf{J}+\mu)(\int \frac{e^{\mu}}{\omega(\mu)} d\mu - \frac{1}{\omega(\mu)}) \tag{6587}$$

4.4.45 Derivation 92

$$\mathbf{J}(q) = \log{(q)} \tag{6588}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{d}{dq}\log{(q)} \tag{6589}$$

$$\frac{d}{dq}\mathbf{J}(q) = \frac{1}{q} \tag{6590}$$

$$(\iint \mathbf{v}\frac{d}{dq}\log{(q)} dq dq)^q = (\iint \mathbf{v}\frac{1}{q} dq dq)^q \tag{6591}$$

$$(\iint \mathbf{v}\frac{d}{dq}\log{(q)} dq dq)^q = (\iint \frac{\mathbf{v}}{q} dq dq)^q \tag{6592}$$

4.4.46 Derivation 94

$$\mathbf{p}(E_x) = \sin{(e^{E_x})} \tag{6593}$$

$$\dot{y}(U) = \sin{(U)} \tag{6594}$$

$$\frac{d}{dU}\dot{y}(U) = \frac{d}{dU}\sin{(U)} \tag{6595}$$

$$\frac{d}{dU}\dot{y}(U) = \cos{(U)} \tag{6596}$$

$$\cos{(U)} + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos{(U)} + \frac{d}{dE_x}\sin{(e^{E_x})} \tag{6597}$$

$$\cos{(U)} + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos{(U)} + e^{E_x}\cos{(e^{E_x})} \tag{6598}$$

$$\cos{(U)} + \frac{d}{dE_x}\mathbf{p}(E_x) = e^{E_x}\cos{(e^{E_x})} + \cos{(U)} \tag{6599}$$

4.4.47 Derivation 95

$$\mathrm{v_y}\,(L) = e^L \tag{6600}$$

$$\frac{d}{dL}\mathrm{v_y}\,(L) = \frac{d}{dL}e^L \tag{6601}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}\,(L) = \frac{d^2}{dL^2}e^L \tag{6602}$$

$$\frac{d^2}{dL^2}\mathrm{v_y}\,(L) = e^L \tag{6603}$$

$$-L + \frac{d^2}{dL^2}\mathrm{v_y}\,(L) = -L + e^L \tag{6604}$$

4.4.48 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{6605}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{\partial}{\partial h}\frac{h}{\mathbf{s}} \tag{6606}$$

$$\frac{\partial}{\partial h}\psi(\mathbf{s}, h) = \frac{1}{\mathbf{s}} \tag{6607}$$

$$\frac{\frac{\partial}{\partial h}\frac{h}{\mathbf{s}}}{\mathbf{s}} = \frac{1}{\mathbf{s}^2} \tag{6608}$$

$$\frac{\frac{\partial}{\partial h}\frac{h}{\mathbf{s}}}{\mathbf{s}} = \frac{1}{\mathbf{s}^2} \tag{6609}$$

4.4.49 Derivation 98

$$\Psi(\delta) = \log{(\delta)} \tag{6610}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{d}{d\delta}\log{(\delta)} \tag{6611}$$

$$\frac{d}{d\delta}\Psi(\delta) = \frac{1}{\delta} \tag{6612}$$

$$\log{(\delta)}\frac{d}{d\delta}\log{(\delta)} = \frac{\log{(\delta)}}{\delta} \tag{6613}$$

4.4.50 Derivation 99

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = 1 \tag{6614}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = 1 \tag{6615}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = 1 \tag{6616}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G, \Omega) = 1 \tag{6617}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6618}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6619}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6620}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6621}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6622}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6623}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6624}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6625}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6626}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6627}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)=1 \tag{6628}$$

$$\frac{\partial}{\partial\Omega}\mathbf{S}(G,\Omega)= \tag{6629}$$

4.5 Perturbation: SR

4.5.1 Derivation 1

$$\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right)=\frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{6630}$$

$$\frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right)=\cos\left(\mathbf{s}\right) \tag{6631}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right)=\frac{d}{d\mathbf{s}}\cos\left(\mathbf{s}\right) \tag{6632}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right)=-\sin\left(\mathbf{s}\right)\frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{6633}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right)=-\sin\left(\mathbf{s}\right)\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right) \tag{6634}$$

$$\frac{d^2}{d\mathbf{s}^2}\sin\left(\mathbf{s}\right)=-\sin\left(\mathbf{s}\right)\mathrm{J}_{\varepsilon}\left(\mathbf{s}\right)+\cos\left(\mathbf{s}\right)\frac{d}{d\mathbf{s}}\sin\left(\mathbf{s}\right) \tag{6635}$$

4.5.2 Derivation 2

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6636}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6637}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6638}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6639}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6640}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6641}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6642}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6643}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6644}$$

$$\frac{\partial}{\partial\Psi_{\lambda}}\mathbb{I}(\Psi_{\lambda})=\mathbb{I}(\Psi_{\lambda}) \tag{6645}$$

4.5.3 Derivation 3

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6646}$$

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6647}$$

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6648}$$

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6649}$$

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6650}$$

$$\int(-\hat{x}_0+\mathbf{r})d\hat{x}_0=\hat{H}-\frac{\hat{x}_0^2}{2}+\hat{x}_0\mathbf{r} \tag{6651}$$

4.5.4 Derivation 5

$$\mathrm{F_c}\left(\mathbf{J},\mathbf{v}\right)=\int(\mathbf{J}+\mathbf{v})d\mathbf{J} \tag{6652}$$

$$\frac{\int(\mathbf{J}+\mathbf{v})d\mathbf{J}}{\frac{\mathbf{J}^2}{2}+\mathbf{J}\mathbf{v}+f}=1 \tag{6653}$$

$$\frac{\partial}{\partial\mathbf{J}}\frac{\int(\mathbf{J}+\mathbf{v})d\mathbf{J}}{\frac{\mathbf{J}^2}{2}+\mathbf{J}\mathbf{v}+f}=\frac{\partial}{\partial\mathbf{J}}1 \tag{6654}$$

4.5.5 Derivation 7

$$\mathrm{C_d}\left(\mathbf{p}\right)=\sin\left(\mathbf{p}\right) \tag{6655}$$

$$\frac{d}{d\mathbf{p}}\mathrm{C_d}\left(\mathbf{p}\right)=\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right) \tag{6656}$$

$$\int F_c\cos\left(\mathbf{p}\right)dF_c=\int F_c\frac{d}{d\mathbf{p}}\sin\left(\mathbf{p}\right)dF_c \tag{6657}$$

4.5.6 Derivation 8

$$\frac{\partial}{\partial\sigma_x}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6658}$$

$$\frac{\partial^2}{\partial\sigma_x^2}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6659}$$

$$\frac{\partial^3}{\partial\sigma_x^3}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6660}$$

$$\frac{\partial^4}{\partial\sigma_x^4}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6661}$$

$$\frac{\partial^5}{\partial\sigma_x^5}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6662}$$

$$\frac{\partial^6}{\partial\sigma_x^6}(e^{\frac{\partial^2}{\partial\varphi^2}\mathrm{f_p}\left(\sigma_x,\varphi\right)})^{\sigma_x}=0 \tag{6663}$$

4.5.7 Derivation 9

$$\hat{p}_0(\phi,\mathbf{H})=\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi) \tag{6664}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1=-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 \tag{6665}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1=-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 \tag{6666}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1=-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 \tag{6667}$$

$$\frac{\partial^2}{\partial\phi^2}(-\mathbf{H}+\phi)=-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)-1 \tag{6668}$$

$$-3\frac{\partial}{\partial\phi}(-\mathbf{H}+\phi)- \tag{6669}$$

4.5.8 Derivation 11

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}\frac{\partial}{\partial g}(\lambda+g) \tag{6670}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}\frac{\partial}{\partial g}(\lambda+g) \tag{6671}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}(\lambda+g) \tag{6672}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}(\lambda+g) \tag{6673}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}\lambda+\frac{\partial}{\partial\lambda}g \tag{6674}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=\frac{\partial}{\partial\lambda}\lambda+\frac{\partial}{\partial\lambda}g \tag{6675}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=1+\frac{\partial}{\partial\lambda}g \tag{6676}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)=1+\frac{\partial}{\partial\lambda}g \tag{6677}$$

$$\frac{\partial}{\partial\lambda}\mathrm{r_0}\left(\lambda,g\right)= \tag{6678}$$

4.5.9 Derivation 12

$$\mathbf{B}(\mathbf{g})=\log\left(\mathbf{g}\right) \tag{6679}$$

$$\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})=\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right) \tag{6680}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\mathbf{B}(\mathbf{g})\right)=\cos\left(\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right)\right) \tag{6681}$$

$$\cos\left(\frac{d}{d\mathbf{g}}\log\left(\mathbf{g}\right)\right)=\cos\left(\frac{1}{\mathbf{g}}\right) \tag{6682}$$

4.5.10 Derivation 15

$$\mathrm{A}_2\left(\hat{H}, \mathbf{B}\right) = \log\left(\mathbf{B}^{\hat{H}}\right) \tag{6683}$$

$$\hat{H}_\lambda(y) = \cos\left(y\right) \tag{6684}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\hat{H}_\lambda(y)}\right) \tag{6685}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6686}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6687}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6688}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6689}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6690}$$

$$\mathrm{A}_2\left(\hat{H}_\lambda(y), \mathbf{B}\right) = \log\left(\mathbf{B}^{\cos\left(y\right)}\right) \tag{6691}$$

4.5.11 Derivation 17

$$\hat{X}(f') = \cos\left(f'\right) \tag{6692}$$

$$\frac{d}{df'}\hat{X}(f') = \frac{d}{df'}\cos\left(f'\right) \tag{6693}$$

$$\frac{d^2}{d(f')^2}\hat{X}(f') = \frac{d^2}{d(f')^2}\cos\left(f'\right) \tag{6694}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\cos\left(f'\right)} = \frac{\frac{d^2}{d(f')^2}\cos\left(f'\right)}{\cos\left(f'\right)} \tag{6695}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\cos\left(f'\right)} = -\frac{\cos\left(f'\right)}{\cos\left(f'\right)} \tag{6696}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\cos\left(f'\right)} = -1 \tag{6697}$$

$$\frac{\frac{d^2}{d(f')^2}\hat{X}(f')}{\cos\left(f'\right)} = -\frac{\cos\left(f'\right)}{\cos\left(f'\right)} \tag{6698}$$

4.5.12 Derivation 18

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6699}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6700}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6701}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6702}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6703}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6704}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6705}$$

$$\int \frac{d}{dP_e}\log\left(P_e\right)dP_e = \int \frac{1}{P_e}dP_e \tag{6706}$$

4.5.13 Derivation 19

$$\mathrm{E}_\lambda\left(\hat{H}_l\right) = \int e^{\hat{H}_l}d\hat{H}_l \tag{6707}$$

$$\mathrm{E}_\lambda\left(\hat{H}_l\right) = 0 \tag{6708}$$

$$0 = (A_y + e^{\hat{H}_l})(A_y + e^{\hat{H}_l} - \int e^{\hat{H}_l}d\hat{H}_l)^2 - \int e^{\hat{H}_l}d\hat{H}_l(A_y + e^{\hat{H}_l} - \int \tag{6709}$$

4.5.14 Derivation 27

$$\phi(x') = \int \log\left(x'\right)dx' \tag{6710}$$

$$\frac{\partial}{\partial x'}\phi(x') = \frac{\partial}{\partial x'}\int \log\left(x'\right)dx' \tag{6711}$$

$$\frac{\partial}{\partial x'}\phi(x') = \log\left(x'\right) \tag{6712}$$

$$\frac{\partial}{\partial x'}\phi(x') = \frac{\partial}{\partial x'}\int \log\left(x'\right)dx' \tag{6713}$$

$$\frac{\partial}{\partial x'}\phi(x') = \log(x') \tag{6714}$$

$$\frac{\partial}{\partial x'}\phi(x') = \frac{\partial}{\partial x'}\int \log(x')dx' \tag{6715}$$

$$\frac{\partial}{\partial x'}\phi(x') = \log(x') \tag{6716}$$

$$\frac{\partial}{\partial x'}\phi(x') = \frac{\partial}{\partial x'}\int \log(x')dx' \tag{6717}$$

$$\frac{\partial}{\partial x'}\phi(x') = \log(x') \tag{6718}$$

$$\frac{\partial}{\partial x'}\phi(x') = \frac{\partial}{\partial x'}\int \log(x')dx' \tag{6719}$$

4.5.15 Derivation 29

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6720}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6721}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6722}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6723}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6724}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6725}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6726}$$

$$\frac{\int q(c_0)dc_0}{q(c_0)} = \frac{n + e^{c_0}}{e^{c_0}} \tag{6727}$$

4.5.16 Derivation 30

$$b(A_x, i) = \frac{\partial}{\partial A_x}(-A_x + i) \tag{6728}$$

$$\frac{\partial}{\partial A_x}(-A_x + i) = -1 \tag{6729}$$

$$\frac{\partial}{\partial A_x}(-A_x + i) = b^{A_x}(A_x, i) \tag{6730}$$

$$\frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i} = 0 \tag{6731}$$

$$\int \frac{-(-1)^{A_x} + b^{A_x}(A_x, i)}{i}di = \int 0di \tag{6732}$$

4.5.17 Derivation 32

$$\mathrm{P_e}(\dot{z}) = \sin(\dot{z}) \tag{6733}$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \frac{d}{d\dot{z}}\sin(\dot{z}) \tag{6734}$$

$$\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \cos(\dot{z}) \tag{6735}$$

$$\mathrm{P_e}(\dot{z})\frac{d}{d\dot{z}}\mathrm{P_e}(\dot{z}) = \mathrm{P_e}(\dot{z})\cos(\dot{z}) \tag{6736}$$

4.5.18 Derivation 38

$$J(\phi_1) = \sin(\phi_1) \tag{6737}$$

$$\frac{d}{d\phi_1}J(\phi_1) = \cos(\phi_1) \tag{6738}$$

$$J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = \sin(\phi_1)\cos(\phi_1) \tag{6739}$$

$$J(\phi_1)\frac{d}{d\phi_1}J(\phi_1) = J(\phi_1)\cos(\phi_1) \tag{6740}$$

4.5.19 Derivation 39

$$M(\mathbf{A}, \varepsilon_0) = \mathbf{A} + \varepsilon_0 \tag{6741}$$

$$\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A} = \int (\mathbf{A} + \varepsilon_0)d\mathbf{A} \tag{6742}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\int (\mathbf{A} + \varepsilon_0)d\mathbf{A})^{\varepsilon_0} \tag{6743}$$

$$(\int M(\mathbf{A}, \varepsilon_0)d\mathbf{A})^{\varepsilon_0} = (\frac{\mathbf{A}^2}{2} + \mathbf{A}\varepsilon_0 + x)^{\varepsilon_0} \tag{6744}$$

4.5.20 Derivation 41

$$\mathrm{F_x}(\pi) = e^{e^{\pi}} \tag{6745}$$

$$\int \mathrm{F_x}(\pi)d\pi = \int e^{e^{\pi}}d\pi \tag{6746}$$

$$0 = F_g - P_g + \int \mathrm{F_x}(\pi)d\pi \tag{6747}$$

4.5.21 Derivation 42

$$\dot{\mathbf{r}}(\lambda, c) = c\cos(\lambda) \tag{6748}$$

$$\cos(\lambda) = \cos(\lambda) \tag{6749}$$

$$\cos^{\lambda}(\lambda) = (\cos(\lambda))^{\lambda} \tag{6750}$$

$$\cos^{\lambda}(\lambda) = (\frac{\partial}{\partial c} c\cos(\lambda))^{\lambda} \tag{6751}$$

4.5.22 Derivation 43

$$G(\nabla) = \cos(\nabla) \tag{6752}$$

$$-G(\nabla) + \int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla - \int \cos(\nabla) d\nabla = -G(\nabla) + \int (\varphi + G(\nabla) + \sin(\nabla)) d\nabla - \int \cos(\nabla) d\nabla \tag{6753}$$

4.5.23 Derivation 44

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{6754}$$

$$\nabla(f^*, \pi) = \frac{\partial}{\partial f^*}(\pi + f^*) \tag{6755}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6756}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6757}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6758}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6759}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6760}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6761}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6762}$$

$$f^*\nabla(f^*, \pi) = f^*\frac{\partial}{\partial f^*}(\pi + f^*) \tag{6763}$$

4.5.24 Derivation 48

$$\mathrm{a}^{\dagger}(\omega) = \int \log(\omega) d\omega \tag{6764}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^{\dagger}(\omega))^{\omega} = \frac{\partial}{\partial \rho}(\omega\log(\omega) - \omega)^{\omega} \tag{6765}$$

$$\frac{\partial}{\partial \rho}(-\rho + \mathrm{a}^{\dagger}(\omega))^{\omega} = \frac{d}{d\rho}(\omega\log(\omega) - \omega)^{\omega} \tag{6766}$$

4.5.25 Derivation 51

$$\mathrm{y}'(\mathbf{s}) = \log(\mathbf{s}) \tag{6767}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \int \log(\mathbf{s}) d\mathbf{s} \tag{6768}$$

$$\int \mathrm{y}'(\mathbf{s}) d\mathbf{s} = \omega - \mathbf{s}\log(\mathbf{s}) + \mathbf{s} \tag{6769}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \int \mathrm{y}'(\mathbf{s}) d\mathbf{s} \tag{6770}$$

$$a(\mathbf{s}) = \mathrm{y}'(\mathbf{s}) - \omega + \mathbf{s}\log(\mathbf{s}) - \mathbf{s} \tag{6771}$$

$$a(\mathbf{s}) = -\mathbf{s}\log(\mathbf{s}) + \mathbf{s} - \omega + \mathrm{y}'(\mathbf{s}) \tag{6772}$$

4.5.26 Derivation 52

$$\mathrm{v_t}(t, \hat{X}) = \hat{X}^t \tag{6773}$$

$$\frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \frac{\partial}{\partial t}\hat{X}^t \tag{6774}$$

$$\frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \hat{X}^t\log(\hat{X}) \tag{6775}$$

$$\hat{X} + \frac{\partial}{\partial t}\mathrm{v_t}(t, \hat{X}) = \hat{X} + \hat{X}^t\log(\hat{X}) \tag{6776}$$

4.5.27 Derivation 53

$$\frac{d}{dA}\mathrm{A_y}(A) = \mathrm{A_y}(A) \tag{6777}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \mathrm{A_y}(A) \tag{6778}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \mathrm{A_y}(A) \tag{6779}$$

$$\frac{d}{dA}\mathrm{A_y}(A) = \mathrm{A_y}(A) \tag{6780}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6781}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6782}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6783}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6784}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6785}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6786}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \mathrm{A_y}\,(A) \tag{6787}$$

$$\frac{d}{dA}\,\mathrm{A_y}\,(A) = \tag{6788}$$

4.5.28 Derivation 54

$$E(r_0, \mathbf{P}) = \frac{r_0}{\mathbf{P}} \tag{6789}$$

$$\frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) = \frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}} \tag{6790}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} = \frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) \tag{6791}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = \frac{\partial}{\partial \mathbf{P}} E(r_0, \mathbf{P}) - \frac{r_0}{\mathbf{P}^3} \tag{6792}$$

$$\frac{\frac{\partial}{\partial \mathbf{P}} \frac{r_0}{\mathbf{P}}}{\mathbf{P}} - \frac{r_0}{\mathbf{P}^3} = -\frac{2r_0}{\mathbf{P}^3} \tag{6793}$$

4.5.29 Derivation 56

$$C(\psi^*) = \sin(\psi^*) \tag{6794}$$

$$C(\psi^*) + \cos(\psi^*) = \sin(\psi^*) + \cos(\psi^*) \tag{6795}$$

4.5.30 Derivation 58

$$\frac{d}{dt_2}(C_1 + \log(t_2))^{t_2} = \frac{d}{dt_2}(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{6796}$$

$$\frac{d}{dt_2}(C_1 + \log(t_2))^{t_2} = \frac{d}{dt_2}(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{6797}$$

$$\frac{d}{dt_2}(C_1 + \log(t_2))^{t_2} = \frac{d}{dt_2}(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{6798}$$

$$\frac{d}{dt_2}(C_1 + \log(t_2))^{t_2} = \frac{d}{dt_2}(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{6799}$$

$$\frac{d}{dt_2}(C_1 + \log(t_2))^{t_2} = \frac{d}{dt_2}(\int \mathrm{E_x}\,(t_2)dt_2)^{t_2} \tag{6800}$$

$$\frac{d}{dt_2}(C_1 + \log(t_2)) \tag{6801}$$

4.5.31 Derivation 61

$$, then obtain \frac{\partial^2}{\partial s^2}(\mathbf{M}+s) = \frac{\partial}{\partial s}(\mathbf{M}+s)+0, then obtain \frac{\partial^2}{\partial s^2}(\mathbf{M}+ \tag{6802}$$

4.5.32 Derivation 67

$$l(\varphi^*) = \frac{d}{d\varphi^*} e^{\varphi^*} \tag{6803}$$

$$l^2(\varphi^*) = \frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} \tag{6804}$$

$$l(\varphi^*) - 1 = l^2(\varphi^*) - 1 \tag{6805}$$

$$l(\varphi^*) - 1 = \frac{d^2}{d(\varphi^*)^2} e^{\varphi^*} - 1 \tag{6806}$$

4.5.33 Derivation 69

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) \tag{6807}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) \tag{6808}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin(C_2)) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin(C_2)) \tag{6809}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin{(C_2)}) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin{(C_2)}) \tag{6810}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin{(C_2)}) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin{(C_2)}) \tag{6811}$$

$$\frac{\partial}{\partial C_2}(\varepsilon + c + 2\sin{(C_2)}) = \frac{\partial}{\partial C_2}(2\varepsilon + 2\sin{(C_2)}) \tag{6812}$$

4.5.34 Derivation 71

$$\mathrm{v_x}(G, L) = G - L \tag{6813}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = \frac{\partial}{\partial G}(G - L) \tag{6814}$$

$$\frac{\partial}{\partial G}\mathrm{v_x}(G, L) = 1 \tag{6815}$$

$$(((\frac{\partial}{\partial G}\mathrm{v_x}(G, L))^G)^G)^G = 1 \tag{6816}$$

4.5.35 Derivation 74

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\mathbf{J}_P + \rho_b}{\mathbf{J}_P}\mathbf{J}_P \tag{6817}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \mathbf{J}_P + \rho_b \tag{6818}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{6819}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{6820}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{6821}$$

$$\frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) = \frac{\partial}{\partial s}\Psi_{nl}(\rho_b, \mathbf{J}_P, s) \tag{6822}$$

4.5.36 Derivation 76

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6823}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6824}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6825}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6826}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6827}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6828}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6829}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6830}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6831}$$

$$\frac{d^2}{d\hat{X}^2}r(\hat{X}) = -\sin{(\hat{X})} \tag{6832}$$

4.5.37 Derivation 77

$$A(\dot{z}) = e^{\sin{(\dot{z})}} \tag{6833}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = \frac{d}{d\dot{z}}e^{\sin{(\dot{z})}} \tag{6834}$$

$$\frac{d}{d\dot{z}}A(\dot{z}) = e^{\sin{(\dot{z})}}\cos{(\dot{z})} \tag{6835}$$

$$(e^{-A(\dot{z}) + \frac{d}{d\dot{z}}A(\dot{z})})^{\dot{z}} = (e^{-A(\dot{z}) + e^{\sin{(\dot{z})}}\cos{(\dot{z})}})^{\dot{z}} \tag{6836}$$

4.5.38 Derivation 78

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{6837}$$

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{6838}$$

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{6839}$$

$$\dot{z}(L_\varepsilon) = \cos{(L_\varepsilon)} \tag{6840}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6841}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6842}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6843}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6844}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6845}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6846}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6847}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6848}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6849}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6850}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6851}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6852}$$

$$\dot{z}(L_\varepsilon) = \cos(L_\varepsilon) \tag{6853}$$

4.5.39 Derivation 79

$$\mathrm{f}'(\varepsilon_0) = \sin(\varepsilon_0) \tag{6854}$$

$$\int 0 d\varepsilon_0 = \int (\cos(\varepsilon_0) - \frac{d}{d\varepsilon_0}\mathrm{f}'(\varepsilon_0)) d\varepsilon_0 \tag{6855}$$

4.5.40 Derivation 84

$$\mathbf{S}(Z) = \int e^Z dZ \tag{6856}$$

$$\mathbf{S}(Z) = e^Z - 1 \tag{6857}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z-1+1)} \tag{6858}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6859}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6860}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6861}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6862}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6863}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6864}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6865}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6866}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6867}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6868}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6869}$$

$$e^{(\mathbf{S}(Z)+1)} = e^{(e^Z)} \tag{6870}$$

4.5.41 Derivation 85

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}e^\varepsilon \tag{6871}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + e^\varepsilon \tag{6872}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6873}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6874}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6875}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6876}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6877}$$

$$\varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) = \varepsilon + \frac{d}{d\varepsilon}\mathrm{A_x}(\varepsilon) \tag{6878}$$

$$\varepsilon \tag{6879}$$

4.5.42 Derivation 87

$$\mathrm{r}_0(\eta, g) = \int (\eta + g) dg \tag{6880}$$

$$\mathrm{r}_0(\eta, g) = \eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg \tag{6881}$$

$$\eta g + \sigma_p + \frac{g^2}{2} + \int (\eta + g) dg = 2\eta g + 2\sigma_p + g^2 + \int (\eta + g) dg \tag{6882}$$

4.5.43 Derivation 89

$$\mathrm{g}'_\varepsilon(\phi) = \sin(\phi) \tag{6883}$$

$$\frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi) = \frac{d}{d\phi} \sin(\phi) \tag{6884}$$

$$\frac{\left(-\cos(\phi) + \frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi)\right)^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} = \frac{\left(-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)\right)^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} \tag{6885}$$

$$\frac{\left(-\cos(\phi) + \frac{d}{d\phi} \mathrm{g}'_\varepsilon(\phi)\right)^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} = \frac{0^\phi}{-\cos(\phi) + \frac{d}{d\phi}\sin(\phi)} \tag{6886}$$

4.5.44 Derivation 90

$$\omega(\mu) = e^\mu \tag{6887}$$

$$\frac{e^\mu}{\omega(\mu)} = \frac{e^\mu}{e^\mu} \tag{6888}$$

$$\frac{e^\mu}{\omega(\mu)} = 1 \tag{6889}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + 1 - \frac{1}{\omega(\mu)} \tag{6890}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + 1 - \frac{1}{e^\mu} \tag{6891}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + 1 - e^{-\mu} \tag{6892}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \mathbf{J} + \mu + 1 - e^{-\mu} \tag{6893}$$

$$\mathbf{J} + \mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} = \int \frac{e^\mu}{\omega(\mu)} d\mu + \frac{e^\mu}{\omega(\mu)} - \frac{1}{\omega(\mu)} \tag{6894}$$

$$\mathbf{J} \tag{6895}$$

4.5.45 Derivation 92

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6896}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6897}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6898}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6899}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6900}$$

$$\frac{\iint \mathbf{v} \frac{d}{dq} \log(q) dq dq}{\log(q)} = \frac{\iint \frac{\mathbf{v}}{q} dq dq}{\log(q)} \tag{6901}$$

4.5.46 Derivation 94

$$\mathbf{p}(E_x) = \sin\left(e^{E_x}\right) \tag{6902}$$

$$\dot{y}(U) = \sin(U) \tag{6903}$$

$$\cos(U) + \frac{d}{dE_x}\mathbf{p}(E_x) = \cos(U) + \frac{d}{dE_x}\sin\left(e^{E_x}\right) \tag{6904}$$

4.5.47 Derivation 95

$$\mathrm{v_y}(L) = e^L \tag{6905}$$

$$2\,\mathrm{v_y}(L) = 2e^L \tag{6906}$$

$$\mathrm{v_y}(L) = e^L \tag{6907}$$

$$\mathrm{v_y}(L) = e^L + \frac{d}{dL}e^L \tag{6908}$$

$$\mathrm{v_y}(L) = e^L + e^L \tag{6909}$$

$$\mathrm{v_y}(L) = e^L + \frac{d}{dL}e^L + \frac{d^2}{dL^2}e^L \tag{6910}$$

$$\mathrm{v_y}\left(L\right) = e^{L} + \frac{d}{dL} e^{L} + \frac{d^{2}}{dL^{2}} e^{L} \tag{6911}$$

$$2\,\mathrm{v_y}\left(L\right) = 2 e^{L} \tag{6912}$$

$$2\,\mathrm{v_y}\left(L\right) = 2 e^{L} + 2 \frac{d}{dL} e^{L} \tag{6913}$$

$$2\,\mathrm{v_y}\left(L\right) = 2 e^{L} + 2 \frac{d}{dL} e^{L} + 2 \frac{d^{2}}{dL^{2}} e^{L} \tag{6914}$$

4.5.48 Derivation 96

$$\psi(\mathbf{s}, h) = \frac{h}{\mathbf{s}} \tag{6915}$$

$$\frac{\partial}{\partial h} \psi(\mathbf{s}, h) = \frac{\partial}{\partial h} \frac{h}{\mathbf{s}} \tag{6916}$$

$$\frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} = \frac{\frac{\partial}{\partial h} \frac{h}{\mathbf{s}}}{\mathbf{s}} \tag{6917}$$

$$\frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} = \frac{\mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h}}}{\mathbf{s}} \tag{6918}$$

$$\frac{\frac{\partial}{\partial h} \psi(\mathbf{s}, h)}{\mathbf{s}} = \mathbf{s}^{-\frac{\mathbf{s}\psi(\mathbf{s},h)}{h} - 1} \tag{6919}$$

4.5.49 Derivation 98

$$\frac{d}{d\delta} \Psi(\delta) = \frac{d}{d\delta} \log\left(\delta\right) \tag{6920}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6921}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6922}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6923}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6924}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6925}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6926}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6927}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6928}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6929}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6930}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6931}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6932}$$

$$\frac{d}{d\delta} \Psi(\delta) = \frac{1}{\delta} \tag{6933}$$

4.5.50 Derivation 99

$$\mathbf{S}(G, \Omega) = G + \Omega \tag{6934}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{6935}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{6936}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega) \tag{6937}$$

$$\mathrm{f_{\mathbf{p}}}\left(G, \Omega\right) = (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} (G + \Omega) \frac{\partial}{\partial \Omega} \mathbf{S}(G, \Omega \tag{6938}$$