

$$\delta I = \int_a^b f(z, \dot{z}, x) dx = 0$$



$$\frac{dI}{d\epsilon} = \int_a^b \left(\frac{\partial f}{\partial z} \frac{dz}{d\epsilon} + \frac{\partial f}{\partial \dot{z}} \frac{d\dot{z}}{d\epsilon} + \frac{\partial f}{\partial x} \frac{dx}{d\epsilon} \right) dx$$

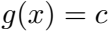
$$\frac{dI}{d\epsilon}\Big|_{\epsilon=0} = \int_a^b \left(\frac{\partial f}{\partial z} \eta + \frac{\partial f}{\partial \dot{z}} \eta' \right) dx$$

$$\int_a^b \left(\frac{\partial f}{\partial z} - \frac{d}{dx} \frac{\partial f}{\partial \dot{z}} \right) \eta dx + \left[\frac{\partial f}{\partial \dot{z}} \eta \right]_a^b \rightarrow 0$$

$$0 = \int_a^b \left(\frac{\partial f}{\partial z} - \frac{d}{dx} \frac{\partial f}{\partial \dot{z}} \eta \right) dx$$

$$\frac{\partial f}{\partial z} = \frac{d}{dx} \frac{\partial f}{\partial \dot{z}} = 0$$

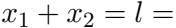


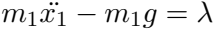


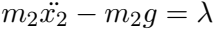
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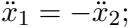
$$\frac{d}{dt} \frac{\partial \mathcal{L}}{\partial \dot{x}} - \frac{\partial \mathcal{L}}{\partial x} = \lambda \frac{\partial f}{\partial x}$$

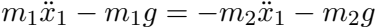
$$\mathcal{L} = \frac{1}{2}m_1\dot{x}_1^2 + \frac{1}{2}m_2\dot{x}_2^2 + m_1gx_1 + m_2gx_2$$





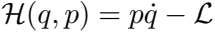






$$\rightarrow \ddot{x}_1 = \frac{(m_1 - m_2)g}{m_1 + m_2}$$





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$$\{A,B\}_{q,p} = \frac{\partial A}{\partial q} \frac{\partial B}{\partial p} - \frac{\partial A}{\partial p} \frac{\partial B}{\partial q}$$

$$\frac{df}{dt} = \{f, \mathcal{H}\} + \frac{\partial f}{\partial t}$$

$$I = \int r^2 dm = \int r^2 \rho(x) dV$$

$$I_{ij} = \int \rho(x) [\delta_j^i |x|^2 - x_i x_j] d^3 x$$

providel = 1m 1d



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$$\left. \frac{d}{dt} \right|_I = \left. \frac{d}{dt} \right|_B + \omega \times (\quad)$$

$$\frac{d}{dt}\bigg|_I \mathbf{L} = \frac{d}{dt}\bigg|_B \mathbf{L} + \boldsymbol{\omega} \times \mathbf{L}$$

$$\frac{d}{dt} I(t) = I \cdot \frac{w}{dt} + w \times I w$$

$$\Gamma_1(e) = I_1 \frac{d\omega_1}{dt} + \omega_2 I_3 \omega_3 - \omega_3 I_2 \omega_2$$

$$I(e) = Iw_1 + w_2 I_2 - I_2$$

$$I_i v_i = w_j w_k (I_j - I_k) + I_i(e)$$

















$$w_1 = -\dot{\alpha} \sin \beta \cos \gamma + \dot{\beta} \cos \gamma$$

$$\omega_2 \equiv \dot{\alpha} \sin \beta \sin \gamma + \dot{\beta} \cos \gamma$$

$$\omega_3 = \dot{\alpha} \cos \beta + \dot{\gamma}$$





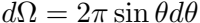
$$\frac{d\sigma}{d\Omega} = \frac{b}{\sin\theta} \left| \frac{db}{d\theta} \right|$$

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THE GREAT TRAIN

$$\mathcal{L}_g = -\rho(x,t)\phi(x,t) - \frac{1}{8\pi G}(\nabla\phi(x,t))^2$$

$$\rightarrow -\rho = \frac{2}{8\pi G} \nabla^2 \phi$$

$$\sqrt{2} \phi = 4\pi G \rho$$





$$\oint \nabla \cdot \mathbf{g} dV$$

$$= \oint \mathbf{g} \cdot d\boldsymbol{\sigma} = -4\pi G M$$

POSTAL BOX 100

$$v_{obs}^{\mu} = \left\{ \frac{dt}{d\tau}, \frac{dx}{d\tau} \right\} = \left\{ \frac{dt}{d\tau}, \gamma v_x \right\}$$

$$E = p^\mu V_\mu = w \frac{dt}{d\tau} - w \cos \theta v_x \gamma$$

W = w - c a w

$$\frac{\omega'}{\omega} = \frac{1 - v \cos \theta}{\sqrt{1 - v^2}}$$

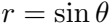
$$\frac{\omega'}{\omega} = \sqrt{\frac{1-v}{1+v}}$$

$$ds^2 = -\left(1 - \frac{2GM}{r}\right) dt^2 + \left(1 + \frac{2GM}{r}\right)^{-1} dr^2 + r^2 d\Omega^2$$

$$ds^2 = -dt^2 + \frac{dr^2}{1 - kr^2} + r^2 d\Omega^2$$







$$w = \frac{1}{2} \int_v \rho(x) \Phi(x) d^3x,$$

$$\mathbf{F} = \int \frac{\sigma^2}{2\epsilon_0} da$$

$$S = \frac{1}{N_0} (E \times B)$$

$$\frac{\partial u}{\partial t} = -\nabla \cdot \mathbf{S}$$

04000



$$P_{em} = \frac{1}{c^2} S$$

$$e^{\sqrt{2}} + x^2 \sqrt{x} = -2 \sqrt{x} - x \sqrt{x}$$

$$\int dV [\psi (\nabla^2 + \kappa^2) \phi - \phi (\nabla^2 + \kappa^2) \psi]$$

$$\int ds \cdot (\psi \nabla \phi - \phi \nabla \psi)$$

$$\mathbf{J} = qNv_{drift} = \frac{n\mathbf{I}}{a}$$



$$\sigma = -\epsilon_0 \frac{\partial \phi}{\partial \eta}$$

$$q' = \frac{-a}{y} q$$

q

=

-q

y

a

$$\Phi = \sum_i \phi_i$$

TO: *Imagined Here*



A pixelated, black and white representation of the text "I'm in a". The characters are blocky and composed of a grid of black and white pixels, giving it a low-resolution, digital art appearance. The text is centered horizontally within the image.



$$\mathbf{F}_m = \int dq (\mathbf{v} \times \mathbf{B}) = \int d\lambda (\mathbf{v} \times \mathbf{B})$$



$$\int (\mathbf{I} \times \mathbf{B}) \cdot d\mathbf{l} = \mathbf{L}$$

$$\mathbf{F} = \int (\mathbf{J} \times \mathbf{B}) d\tau$$

$$\psi(r') = \frac{-ik e^{ik(r_0+r')}}{2\pi r_0 r'} \int_{\sigma} dx dy e^{iq \cdot x}$$



$$e^{ikr}$$

$$\sim$$

$$r^2$$

$$\nabla \times \mathbf{E} = - \frac{\partial^2 \mathbf{B}}{\partial t^2} \cdot da$$

$$\oint \nabla \times \mathbf{E} \cdot d\mathbf{a} = - \int \frac{\partial^2 \mathbf{B}}{\partial t^2} \cdot d\mathbf{a}$$

$$\oint \mathbf{E} \cdot d\mathbf{l} = - \frac{d}{dt} \int \mathbf{B} \cot da$$

$$\mathbf{B}(\mathbf{r}) = \frac{\mu_0}{4\pi} \int \frac{\mathbf{I} \times \hat{\mathbf{r}}}{r^2} dl'$$

$$= \frac{\mu_0}{4\pi} I \int \frac{d\mathbf{l} \times \hat{r}}{r^2}$$

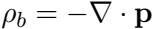
$$\mathbf{P} = \int \mathbf{r}' \rho(\mathbf{r}') d\tau' = \sum_{i=1} q_i \mathbf{r}'_i$$

$$V_{dipole}(r) = \frac{1}{4\pi\epsilon_0} \frac{\mathbf{P} \cdot \hat{r}}{r^2}$$



$$\mathbf{E}_{dip}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0 r^3} [3(\mathbf{p} \cdot \hat{r})\hat{r} - \mathbf{p}]$$





W E I R D

$$\nabla \times \mathbf{B} = \mu_0 \mathbf{J} + \frac{1}{c^2} \frac{\partial^2 \mathbf{E}}{\partial t^2}$$

$$\int \nabla \times \mathbf{B} \cdot d\mathbf{a} = \mu_0 \int \mathbf{J} \cdot d\mathbf{a} + \frac{1}{c^2} \frac{d}{dt} \int \mathbf{E} \cdot d\mathbf{a}$$

$$\oint \mathbf{B} \cdot d\mathbf{l} = \mu_0 \int \mathbf{J} \cdot d\mathbf{a} + \frac{1}{c^2} \frac{d}{dt} \int \mathbf{E} \cdot d\mathbf{a}$$



$$\frac{Q}{\epsilon_0} = \oint \mathbf{E} \cdot d\mathbf{a} = \iiint \nabla \cdot \mathbf{E} \cdot dV$$



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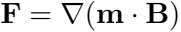
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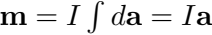
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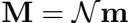


$$\mathbf{B} = \frac{\mu_0}{4\pi} \left(\frac{3\mathbf{r}(\mathbf{m} \cdot \mathbf{r})}{r^5} - \frac{\mathbf{m}}{r^3} \right) = \frac{\mu_0}{4\pi} \frac{1}{r^3} (3(\mathbf{m} \cdot \hat{r})\hat{r} - \mathbf{m})$$









BEFORE + IN

$$T_{ij} = \epsilon_0 \left[E_i E_j - \frac{1}{2} \delta_{ij} E^2 \right] +$$

$$\frac{1}{\mu_0} \left[B_i B_j - \frac{1}{2} \delta_{ij} B^2 \right]$$

$$\frac{\partial^2 \mathcal{P}_{mech} + \mathcal{P}_{em}}{\partial t^2} = \nabla \cdot \mathbf{T}$$

Wormholes

$$dV = \frac{dq}{C} \rightarrow qdV = dU = \frac{qdq}{C}$$

$$U = \frac{q^2}{2C} = \frac{1}{2}vq = \boxed{\frac{1}{2}cv^2 = U}$$





$$P = I I \frac{dI}{dt}$$

$$\int dP dE = \int I I dI$$

$$U = \frac{1}{2}LI^2$$

$$w = \frac{\epsilon_0}{2} \epsilon_r E^2 d\tau = \frac{1}{2} \int \mathbf{D} \cdot \mathbf{E} d\tau$$

$$v = \frac{1}{2\mu_0} \int \mathbf{H} \mathbf{B} d\tau$$

$$v_{em} = \frac{1}{2} (\mathbf{E} \cdot \mathbf{D} + \mathbf{B} \cdot \mathbf{H})$$

Electric and Magnetic fields:

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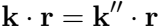
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$$\begin{bmatrix} a & b \\ c & d \end{bmatrix}^{-1} = \frac{1}{\det} \begin{bmatrix} d & -b \\ -c & a \end{bmatrix}$$

$$\sigma_x = \begin{bmatrix} 0 & 1 \\ 1 & 0 \end{bmatrix}$$

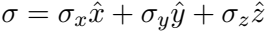
$$\sigma_y = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$$

$$\sigma_z = \begin{bmatrix} 1 & 0 \\ 0 & -1 \end{bmatrix}$$

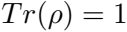








$$\rho = \sum_i w_i |a^i\rangle \langle a^i|$$

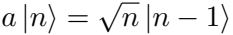




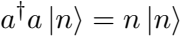


$$a_{\pm} = \left(\frac{mv}{2\hbar} \right)^{1/2} x \mp i \left(\frac{1}{2\hbar v m} \right)^{1/2} p$$

$$x = c_1 a + a^\dagger \quad \text{and} \quad p = c_2 a - a^\dagger$$



$$\begin{aligned}
 & \frac{1}{\sqrt{1-x^2}} = \frac{1}{\sqrt{1-x^2}} \\
 & \frac{1}{\sqrt{1-x^2}} = \frac{1}{\sqrt{1-x^2}}
 \end{aligned}$$



$$Z = \sum_{n=0}^{\infty} (e^{\mu\beta} e^{-E\beta})^N$$

$$\rightarrow \frac{1}{1 - e^{(E - \mu)\beta}} = \mathcal{Z}$$

$$n = \frac{1}{\beta} \frac{\partial^2 \ln(Z)}{\partial \mu^2} \rightarrow$$

$$w = \left[\exp \left(\frac{1}{\sqrt{2}} \left(w_1 - 1 \right) \right) \right]$$

= 1 + e² - e²

$$N = kT \frac{\partial}{\partial \mu} \ln Z$$

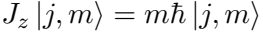
$$= \frac{1}{e^{(\epsilon - \mu)\beta}} + 1$$

1234567890

15. 12. 2024



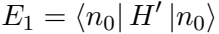
$$x^2 + 1 = (x + i)(x - i)$$



$$J_{\pm |j, m)} = \sqrt{j(j \pm m + 1)} J_{\pm |j, m \pm 1)}$$

$A_0 + A_1 + A_2 + A_3 + A_4 + A_5 + A_6 + A_7 + A_8 + A_9 + A_{10} + A_{11} + A_{12} + A_{13} + A_{14} + A_{15} + A_{16} + A_{17} + A_{18} + A_{19} + A_{20} + A_{21} + A_{22} + A_{23} + A_{24} + A_{25} + A_{26} + A_{27} + A_{28} + A_{29} + A_{30} + A_{31} + A_{32} + A_{33} + A_{34} + A_{35} + A_{36} + A_{37} + A_{38} + A_{39} + A_{40} + A_{41} + A_{42} + A_{43} + A_{44} + A_{45} + A_{46} + A_{47} + A_{48} + A_{49} + A_{50} + A_{51} + A_{52} + A_{53} + A_{54} + A_{55} + A_{56} + A_{57} + A_{58} + A_{59} + A_{60} + A_{61} + A_{62} + A_{63} + A_{64} + A_{65} + A_{66} + A_{67} + A_{68} + A_{69} + A_{70} + A_{71} + A_{72} + A_{73} + A_{74} + A_{75} + A_{76} + A_{77} + A_{78} + A_{79} + A_{80} + A_{81} + A_{82} + A_{83} + A_{84} + A_{85} + A_{86} + A_{87} + A_{88} + A_{89} + A_{90} + A_{91} + A_{92} + A_{93} + A_{94} + A_{95} + A_{96} + A_{97} + A_{98} + A_{99}$

$$\|v\| = \|x_0\| + x^2 \|x_1\| + x^2 \|x_2\| + \dots$$



$$|n_1\rangle = \sum_{m=1, m \neq n}^{\infty} \frac{\langle n_0 | H' | n_0 \rangle}{E_n^{(0)} - E_m^{(0)}} |n_0\rangle$$

$$E2 = \sum_{m=1, m \neq n}^{\infty} \frac{|\langle n_0 | H' | n_0 \rangle|^2}{E_n^{(0)} - E_m^{(0)}}$$

$$|\psi^+\rangle = |i\rangle + \frac{1}{E_i - H_0 + i\eta\epsilon} V |\psi^+\rangle$$

$$\psi^{\pm}(x,t) = \phi^{\pm}(x,t) - \frac{n}{2\pi\hbar^2} \int_{-\infty}^{\infty} dx'$$

$$x \frac{e^{\pm i k |x-x'|}}{|x-x'|} V(x') \psi_{\pm}(x', t)$$





$$f^{(1)}(k,k') = \frac{-m}{\hbar^2 2\pi} \int_{-\infty}^{\infty} e^{i(k-k')\cdot\mathbf{r}} V(\mathbf{r}) d^3\mathbf{r}$$

$$f^{(1)}(\theta) = -\frac{2m}{\hbar^2 q} \int_0^\infty r dr V(r) \sin(qr)$$

$$\frac{d\sigma}{d\Omega} = |f(1)(\theta)|^2$$

$$w_{ij} = \frac{2\pi}{h} |\langle \psi | V | \psi_i \rangle|^2 \rho(E_i)$$

$$E = \frac{\langle a | H | a \rangle}{\langle a | a \rangle}$$



$$\frac{dE}{d\alpha} = 0 \iff E = E_0;$$

$$\dot{c}_m(t) = -c_m(t) \left| \left[\frac{\partial}{\partial t} \middle| m; t \right] \right|$$

$$-\sum_n c_n(t) e^{i(\theta_n - \theta_m)} \frac{\langle m; t | H | n; t \rangle}{E_n - E_m}$$

$$i\frac{\partial}{\partial s}U(t,t_0)=\frac{H}{\hbar/I}U(t,t_0)=\frac{H}{\hbar\Omega}U(t,t_0)$$

THE WORLD OF

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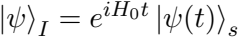
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English - English





$$P = \frac{1}{Z} e^{-E/\beta}$$

$$e^{-F\beta} = \int \frac{1}{h^n c} e^{-E\beta} dp_1 \dots dq_n = \sum_i e^{-E_i \beta} = Z$$





negativity $f = ev\beta$

$$Z = \sum_i f_i e^{-\epsilon_i \beta}$$



$$U_{\text{thermal}} = N \cdot f \cdot \frac{1}{2} kT$$

$$-\frac{1}{2}mv_i^2, \quad -\frac{1}{2}I\omega_i^2, \quad -\frac{1}{2}k_s x^2;$$



$$\Delta S = \int \frac{dQ}{T}$$

SECRET

$$S = - \sum_i p_i \ln p_i$$

5-12-19

$$\langle (\Delta E)^2 \rangle = \frac{\partial^2 \ln \mathcal{Z}}{\partial \beta^2}$$

$$C_v = \frac{\partial \langle E \rangle}{\partial T} = \frac{\partial}{\partial T} \left(\langle E^2 \rangle - \langle E \rangle^2 \right)$$

$$Z = \sum_n e^{-\beta \hbar \omega n} = \frac{1}{1 - e^{-\beta \hbar \omega}}$$

$$d^3n = \frac{V}{h^3} d^3p = \frac{4\pi V}{h^3} k^2 dk$$

www.ck12.org



$$u = - \frac{\partial \ln Z}{\partial \beta}$$

$$\rightarrow U = (2) \frac{4\pi V}{(2\pi)^3} \int \frac{\omega k^2}{1 - e^{-\beta\omega}} dk e^{-\beta\omega}$$

$$\frac{U}{V} = \frac{8\pi}{(2\pi)^3} \int \frac{k^3 dk}{1 - e^{-\beta k}} e^{-\beta k}$$

$$\int \frac{x^3 dx}{e^x - 1} = \dots$$

$$\frac{U}{V} = \frac{8\pi}{(2\pi)^3} (kT)^4 \int \frac{x^3 dx}{e^x - 1}$$

$$= \frac{\pi^2 (kT)^4}{15 \hbar^3 c^3} \equiv \sigma T^4$$



$$Z = \sum_{N=0}^{\infty} \Omega[f e^{-\beta E}]^N$$

$$\langle n \rangle = \frac{1}{\beta} \frac{\partial \ln \mathcal{Z}}{\partial \mu}$$

odds are odd

dI

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dS

$=$

$d\rho$

\wedge

dV

$$dT = \frac{\partial T}{\partial S} dV \wedge dS + \frac{\partial T}{\partial V} dV$$

$$\frac{\partial T}{\partial V} dV \wedge dS = \frac{\partial p}{\partial S} dS \wedge dV$$

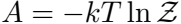


$$\frac{\partial T}{\partial V} = - \frac{\partial p}{\partial S}$$

$$Z = \frac{V}{h^3} \int d^3p \left[e^{-\beta p^2/2m} \right] = \frac{V}{h^3} \sqrt{\frac{2\pi m}{\beta}}^3$$

$$Z = \frac{V^N}{h^{3N}} \left(\frac{2\pi m}{\beta} \right)^{3N/2} = V^N \left(\frac{2\pi m}{h^2 \beta} \right)^{3N/2}$$

$$Z = \frac{V^N}{\lambda_{th}^{3N}}$$



$$S = - \frac{\partial A}{\partial T}$$



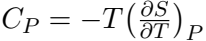


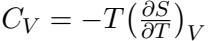




$$\frac{1}{\sqrt{2\pi}} \int_{-\infty}^{\infty} e^{-\frac{1}{2}x^2} dx = 1$$

$$\frac{OP}{OQ} = \frac{1}{V} \left(\frac{OV}{OP} \right)$$

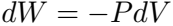




$$C_v = C_p - \frac{v\alpha_p^2}{k_T}$$

$$k_T \equiv - \frac{1}{v} \frac{\partial v}{\partial p} \bigg|_p$$

$$\alpha_p = - \frac{1}{v} \frac{\partial v}{\partial T} \Big|_p$$



$$W = - \int_{v_i}^{v_f} P dV$$

$$= - \int_{v_i}^{v_f} \frac{N T}{V} dv$$

$$W = -NT \ln \frac{v_i}{v_f}$$

$$U = \int \frac{N T}{2} \rightarrow dU = \int \frac{N}{2} dT$$

$$\frac{f}{2} N dT = -P dV \rightarrow \frac{f}{2} N dT = -\frac{N T}{V} dV$$

$$\frac{f}{2} \frac{dT}{T} = - \frac{dV}{V} \rightarrow V T^{f/2} = V_0 T_0^{f/2}$$

$$PV^\gamma = \text{const}; \quad \gamma = \frac{f+2}{f}$$



1 = 123456789







$$v \times \vec{R} = \vec{w} \times \vec{v} + \vec{w} \times \vec{v}$$

ψ = A cos ωt + B sin ωt

we are doing this work



$$\frac{\rho}{R} \frac{\partial}{\partial \rho} \left(\rho \frac{\partial R}{\partial \rho} \right) = v^2$$

$$\frac{1}{\psi} \frac{\partial^2 \psi}{\partial \phi^2}$$



$$\Phi = \sum_{l,m} Y_l^m(\Omega) \left[A_l r^l + \frac{B_l}{r^{l+1}} \right]$$

$$= \sum_{l,m} P_l(\cos \theta) e^{im\phi} \left[A_l r^l + \frac{B_l}{r^{l+1}} \right]$$

A pixelated, black and white graphic of the text "F00B0" followed by a horizontal line and a vertical line, resembling a stylized "1". The text is rendered in a blocky, digital font. The horizontal line is composed of two parallel segments, and the vertical line is a single, thick stroke. The entire graphic is set against a white background.

$$P_2(\cos \theta) = \frac{1}{2}(3\cos^2\theta - 1)$$

$$\int_{-1}^1 P_m(x) P_n(x) dx = \frac{2}{2n+1} \delta_{mn}$$

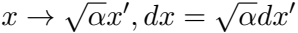
$$\int_{-\infty}^{\infty} e^{-x^2} dx = \sqrt{\pi}$$

$$\int_{-\infty}^{\infty} e^{-x^2} dx \int_{-\infty}^{\infty} e^{-y^2} dy = \int_{-\infty}^{\infty} e^{-(x^2+y^2)} dx dy$$

$$= \int_0^{\infty} dr \int_0^{2\pi} r d\theta e^{-r^2}$$

2nd Floor

$$\int_{-\infty}^{\infty} e^{-ax^2} dx = \sqrt{\frac{\pi}{a}}$$



$$\int_{-\infty}^{\infty} x^2 e^{-ax^2} dx = \frac{\sqrt{\pi}}{2a^{3/2}}$$

$$\int_{-\infty}^{\infty} x^2 e^{-ax^2} dx$$

$$= - \int_{-\infty}^{\infty} \frac{d}{d\alpha} e^{-\alpha x^2} dx$$

$$= -\frac{d}{d\alpha} \int_{-\infty}^{\infty} e^{-\alpha x^2} dx$$

$$= - \frac{d}{da} \sqrt{\frac{\pi}{a}}$$

$$\int_{-\infty}^{\infty} dx e^{-\frac{a}{2}x^2 + Jx} = \sqrt{\frac{2\pi}{a}} e^{J^2/2a}$$



$$dx e^{-\frac{\alpha}{2} + \sqrt{x}}$$

$$-\frac{a}{2}x^2 + Jx = -\frac{a}{2}\left(x^2 - \frac{2Jx}{a}\right)$$

$$= -\frac{a}{2}\left(x - \frac{j}{a}\right)^2 + \frac{j^2}{2a}$$

$$\rightarrow \int_{-\infty}^{\infty} e^{-\frac{\alpha}{2}\left(x-\frac{J}{\alpha}\right)^2} dx e^{J^2/2\alpha}$$

$$u = x - \frac{j}{a}, \quad du = dx$$

$$\int_{-\infty}^{\infty} dx e^{-\frac{\alpha}{2} + iJx} = \sqrt{\frac{2\pi}{\alpha}} e^{-J^2/2\alpha}$$



$$\int_{-\infty}^{\infty} dx e^{i\frac{\alpha}{2} + iJx} = \sqrt{\frac{2\pi i}{\alpha}} e^{-J^2/2\alpha}$$

