$$\mathbf{F} = \frac{1}{4\pi\epsilon_0}\frac{Qq}{\mathscr{r}^2}\hat{\boldsymbol{\mathscr{r}}} = q\mathbf{E}$$
$$\mathbf{E}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\int \mathrm{d}\tau' \rho(\mathbf{r}')\frac{\hat{\boldsymbol{\mathscr{r}}}}{\mathscr{r}^2}$$
$$\oint_\sigma \mathrm{d}\mathbf{a}\cdot\mathbf{E} = Q_{enc}/\epsilon_0$$
$$\nabla\cdot\mathbf{E} = \rho(\mathbf{r})/\epsilon_0 \quad \nabla\times\mathbf{E} = 0$$
$$V(\mathbf{r}) = -\int_{\infty/ref}^{\mathbf{r}} \mathrm{d}\hat{\ell}\cdot\mathbf{E}$$
$$\Delta V = \int_a^b \mathrm{d}\hat{\ell}\cdot\mathbf{E} \quad \mathbf{E} = -\nabla V$$
$$V(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\int \mathrm{d}\tau' \frac{\rho(\mathbf{r}')}{\mathscr{r}}$$
$$\mathbf{E}_\perp^{above} - \mathbf{E}_\perp^{below} = \sigma\hat{\mathbf{n}}/\epsilon_0$$
$$\frac{\partial V^{above}}{\partial\hat{\mathbf{n}}} - \frac{\partial V^{below}}{\partial\hat{\mathbf{n}}} = -\sigma/\epsilon_0$$
$$\nabla\cdot\frac{\hat{\boldsymbol{\mathscr{r}}}}{\mathscr{r}^2} = 4\pi\delta(\hat{\boldsymbol{\mathscr{r}}}) \quad \epsilon_{123} = 0$$
$$c = \sqrt{a^2+b^2-2ab\cos\theta}$$
$$=$$
$$\nabla\times(r^n\hat{\mathbf{r}}) = 0$$

$$\nabla^2 V = -\frac{1}{\epsilon_0}\rho$$
$$V_{grounded} = 0$$
$$A_n = \frac{2}{a}\int_0^a f(x)\cos(n\pi x/a)\,\mathrm{d}x$$
$$B_n = \frac{2}{a}\int_0^a f(x)\sin(n\pi x/a)\,\mathrm{d}x$$
$$\cosh(x) = (e^x+e^{-x})/2$$
$$\sinh(x) = (e^x-e^{-x})/2$$
$$P_0(x) = 1 \quad P_1(x) = x$$
$$P_2(x) = \frac{1}{2}(3x^2-1)$$
$$P_3(x) = \frac{1}{2}(5x^3-3x)$$
$$V_{spher}(r,\vartheta) =$$
$$= \sum_{l=0}^\infty \left(A_l r^l + \frac{B_l}{r^{l+1}}\right)P_l(\cos\vartheta)$$
$$V_{cyl}(f,\varphi) = G\ln r + H +$$
$$\sum_{k=1}^\infty \left[(C_k r^k + D_k r^{-k})\times\right.$$
$$\left.(A_k\cos k\varphi + B_k\sin k\varphi)\right]$$

$$W = \frac{1}{2}\sum_i q_i V_i \equiv \frac{1}{2}\int \rho V\,\mathrm{d}\tau$$
$$W = \frac{1}{2}\int_{\mathcal{V}} \mathrm{d}\tau\,\rho(\mathbf{r})V(\mathbf{r})$$
$$W = \frac{\epsilon_0}{2}\left(\int_{\mathcal{V}} E^2\,\mathrm{d}\tau + \right.$$
$$\left.\oint_\sigma V\mathbf{E}\cdot\mathrm{d}\mathbf{a}\right)$$
$$W = \frac{\epsilon_0}{2}\int_{\text{all space}} E^2\,\mathrm{d}\tau$$
$$V_{cap} \equiv V_+ - V_-$$
$$C \equiv Q/V_{cap}$$
$$E_{plane} = \sigma/2\epsilon_0$$
$$V_{plates} = Qd/A\epsilon_0$$
$$W_{cap} = QV_{cap} = Q^2/2C$$
$$\mathbf{A}\times\mathbf{B} = \sum_{i,j,k}\epsilon_{ijk}\hat{e}_i A_j B_k$$
$$\nabla\cdot(\nabla f\times\nabla g) = 0$$
$$\delta(kx-x') \propto \delta(x-x'/k)$$

$$V_{mp}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\int \mathrm{d}\tau'\frac{\rho(\mathbf{r}')}{|\mathbf{r}-\mathbf{r}'|} \quad \nabla'(1/\mathscr{r}) = \hat{\boldsymbol{\mathscr{r}}}/\mathscr{r}^2$$
$$\frac{1}{|\mathbf{r}-\mathbf{r}'|} \simeq \frac{1}{r} + (-\mathbf{r}')\cdot\nabla\frac{1}{r} + \frac{1}{2}(-\mathbf{r}'\cdot\nabla)^2\frac{1}{r} + \cdots$$
$$V_{mp}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\left[\frac{q}{r} + \frac{\hat{\mathbf{r}}\cdot\mathbf{p}}{r^2} + \frac{1}{2r^3}\hat{\mathbf{r}}\cdot\underline{\underline{\mathbf{Q}}}\cdot\hat{\mathbf{r}} + \cdots\right]$$
$$\underline{\underline{\mathbf{Q}}} = \int \mathrm{d}\tau'\rho(\mathbf{r}')[-(\mathbf{r}')^2\mathbb{1} + 3\mathbf{r}'\mathbf{r}']$$
$$\frac{1}{|\mathbf{r}-\mathbf{r}'|} = \sum_{\ell=0}^\infty \frac{(r')^\ell}{r^{\ell+1}}P_\ell(\cos\alpha) \qquad \cos\alpha = \hat{\mathbf{r}}\cdot\hat{\mathbf{r}}'$$
$$V_{mp}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\sum_{\ell=0}^\infty \frac{1}{r^{\ell+1}}\int \mathrm{d}\tau'\rho(\mathbf{r}')(r')^\ell P_\ell(\cos\alpha)$$
$$V_{dp} = \frac{1}{4\pi\epsilon_0}\frac{1}{r^2}\hat{\mathbf{r}}\cdot\mathbf{p} \quad \mathbf{E}_{dp} = -\frac{1}{4\pi\epsilon_0}\frac{1}{r^3}[\mathbf{p} - 3\hat{\mathbf{r}}\hat{\mathbf{r}}\cdot\mathbf{p}]$$
$$\mathbf{p} = \int \mathrm{d}\tau'\rho(\mathbf{r}')\mathbf{r}' = \sum_i q_i\mathbf{r}_i \qquad \mathbf{p}_{phys} = q\mathbf{d}$$
$$(\mathbf{a}\cdot\nabla)\mathbf{f} = \mathbf{a}\cdot\nabla\mathbf{f} \quad \nabla\mathbf{r} = \mathbb{1} = \nabla\hat{\mathbf{r}}$$
$$\nabla\nabla\frac{1}{r} = \frac{1}{r^3}(-\mathbb{1} + 3\hat{\mathbf{r}}\hat{\mathbf{r}}) \quad \nabla(r^n) = nr^{n-1}\hat{\mathbf{r}}$$
$$\nabla(\mathbf{a}\cdot\mathbf{b}) = (\nabla\mathbf{a})\cdot\mathbf{b} + (\nabla\mathbf{b})\cdot\mathbf{a}$$
$$\mathbf{p} = \alpha\mathbf{E} \qquad \mathbf{N}_{dp} = \mathbf{p}\times\mathbf{E}$$
$$\mathbf{F}_{dp} = q(\Delta\mathbf{E}) \simeq (\mathbf{p}\cdot\nabla)\mathbf{E}$$

$$W_{dp} = -\mathbf{p}\cdot\mathbf{E} \quad D_{ab}^\perp - D_{bel}^\perp = \sigma_f$$
$$V_{de}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\int_{\mathcal{V}}\frac{\mathbf{P}(\mathbf{r}')\cdot\hat{\boldsymbol{\mathscr{r}}}}{\mathscr{r}^2}\,\mathrm{d}\tau'$$
$$V_{de}(\mathbf{r}) = \frac{1}{4\pi\epsilon_0}\left[\oint_{\mathcal{S}}\frac{\sigma_b}{\mathscr{r}}\,\mathrm{d}a' + \int_{\mathcal{V}}\frac{\rho_b}{\mathscr{r}}\,\mathrm{d}\tau'\right]$$
$$\sigma_b = \mathbf{P}\cdot\hat{\mathbf{n}} \qquad \rho_b = -\nabla\cdot\mathbf{P}$$
$$\nabla\cdot\mathbf{D} = \rho_f \quad \mathbf{D} \equiv \epsilon_0\mathbf{E}_{tot} + \mathbf{P}$$
$$\oint \mathrm{d}\mathbf{a}\cdot\mathbf{D} = Q_{f,enc} \quad \mathbf{P} = \epsilon_0\chi_e\mathbf{E}_{tot}$$
$$\mathbf{D} = \epsilon_0(1+\chi_e)\mathbf{E}_{tot}$$
$$\rho_b = -\frac{\chi_e}{1+\chi_e}\rho_f \quad \mathbf{E}_{\text{sph,unif}} = -\frac{1}{3\epsilon_0}\mathbf{P}$$
$$\mathbf{D} = \epsilon_0\mathbf{E}_{vac} \quad \mathbf{E} = \mathbf{E}_{vac}/\kappa$$
$$\epsilon_{ab}\frac{\partial V_{ab}}{\partial n} - \epsilon_{bel}\frac{\partial V_{bel}}{\partial n} = -\sigma_f$$
$$\frac{\partial\mathbf{E}}{\partial t} + \frac{\mathbf{J}}{\epsilon_0} - \frac{\nabla\times\mathbf{B}}{\epsilon_0\mu_0} = 0$$
$$\mathbf{B}(\mathbf{r}) = \frac{\mu_0}{4\pi}\int \mathrm{d}\tau'\frac{\mathbf{J}(\mathbf{r})\times\hat{\boldsymbol{\mathscr{r}}}}{\mathscr{r}^2}$$
$$\mathbf{B}(\mathbf{r}) = \frac{\mu_0}{4\pi}\nabla\times\int \mathrm{d}\tau'\frac{\mathbf{J}(\mathbf{r}')}{\mathscr{r}}$$

$$\kappa \equiv 1 + \chi_e \equiv \epsilon_r$$
$$C = \kappa Q/V_{vac}$$
$$W_C = \kappa CV^2/2$$
$$W = \frac{1}{2}\int \mathrm{d}\tau\,\mathbf{D}\cdot\mathbf{E}$$
$$\mathbf{v}\times\mathbf{E} = \mathbf{B}/\epsilon_0\mu_0$$
$$\nabla\cdot\mathbf{J}_{ms} = \mathbf{0}$$
$$\nabla\cdot\mathbf{B}_{ms} = \mathbf{0}$$
$$\nabla\times\mathbf{B} = \mu_0\mathbf{J}$$
$$\mathbf{I} = \lambda\mathbf{v} = q/\Delta t$$
$$\mathbf{F} = q(\mathbf{E} + \mathbf{v}\times\mathbf{B})$$
$$\mathbf{F} = \int \mathrm{d}\tau'\mathbf{J}\times\mathbf{B}$$
$$\oint \mathrm{d}\ell\cdot\mathbf{B} = \mu_0 I_{enc}$$
$$= \mu_0\int \mathrm{d}\mathbf{a}\cdot\mathbf{J}(\mathbf{r})$$
$$\mathbf{B} = \nabla\times\mathbf{A}$$
$$\nabla^2\mathbf{A} = -\mu_0\mathbf{J}$$

$$\mathbf{A}(\mathbf{r}) = \frac{\mu_0}{4\pi}\int \mathrm{d}\tau'\frac{\mathbf{J}(\mathbf{r}')}{\mathscr{r}} \qquad \mathbf{I} \equiv I\,\mathrm{d}\boldsymbol{\ell}$$
$$\mathbf{v}_{\text{rot}} = \boldsymbol{\omega}\times\mathbf{r}'$$
$$\nabla\cdot\mathbf{B} = 0$$
$$\oint \mathrm{d}\mathbf{a}\cdot\mathbf{B} = 0$$
$$B^{ab}_{\mathbf{n},\perp} - B^{bel}_{\mathbf{n},\perp} = 0$$
$$B^{ab}_{cp,\perp} - B^{bel}_{cp,\perp} = \mu_0 K$$
$$B^{ab}_{cp,\parallel} - B^{bel}_{cp,\parallel} = 0$$
$$\mathbf{B}^{ab} - \mathbf{B}^{bel} = \mu_0\mathbf{K}\times\mathbf{n}$$
$$\mathbf{A}^{ab} - \mathbf{A}^{bel} = 0$$
$$\frac{\partial\mathbf{A}^{ab}}{\partial n} - \frac{\partial\mathbf{A}^{bel}}{\partial n} = -\mu_0\mathbf{K}$$
$$\mathbf{A}_{mp,m}(\mathbf{r})$$
$$= \frac{\mu_0}{4\pi}\left[\frac{1}{r}\int \mathrm{d}\tau'\mathbf{J}(\mathbf{r}') + \frac{\mathbf{r}}{r^3}\int \mathrm{d}\tau'\mathbf{r}'\mathbf{J}(\mathbf{r}') + \cdots\right]$$
$$\frac{\partial\rho}{\partial t}_{ms} = 0 \quad \int_{\mathcal{V}}\mathbf{J}(\mathbf{r}') = \frac{\mathrm{d}\mathbf{p}}{\mathrm{d}t}$$
$$\mathbf{J}(\mathbf{r}') = \mathbf{r}'\nabla'\cdot\mathbf{J}(\mathbf{r}')$$
$$\mathbf{m} = \frac{1}{2}\int \mathrm{d}\tau'\mathbf{r}'\times\mathbf{J}(\mathbf{r}')$$

$$\mathbf{A}_{dp,m}(\mathbf{r}) = \frac{\mu_0}{4\pi}\frac{\mathbf{m}\times\mathbf{r}}{r^3}$$
$$\mathbf{B}_{dp,m}(\mathbf{r}) = \frac{\mu_0}{4\pi}\frac{3\mathbf{m}\cdot\hat{\mathbf{r}}\hat{\mathbf{r}} - \mathbf{m}}{r^3}$$
$$\nabla\frac{\mathbf{r}}{r^3} = \frac{\mathbb{1} - 3\hat{\mathbf{r}}\hat{\mathbf{r}}}{r^3}$$
$$\mathbf{m}_{loop} = I\mathbf{a} = I\frac{1}{2}\int \mathbf{r}'\times\mathrm{d}\boldsymbol{\ell}'$$
$$\mathbf{f} \equiv \mathbf{F}/\mathbf{q} \quad \mathbf{f} \equiv \mathbf{v}\times\mathbf{B}, \mathbf{E}\cdots$$
$$\mathbf{J} = \frac{nq^2}{m\gamma}\mathbf{f} = \sigma_{cond}\mathbf{f}$$
$$\mathbf{J} = \sigma\mathbf{E} \quad I = \int \mathbf{J}\cdot\mathrm{d}\mathbf{a}$$
$$\varepsilon \equiv \oint \mathbf{f}\cdot\mathrm{dl} \quad \mathbf{E} = -\mathbf{f}_{src,ideal}$$
$$\varepsilon \equiv \oint \mathbf{E}\cdot\mathrm{dl} \quad \varepsilon \equiv IR \quad \varepsilon = -\frac{\mathrm{d}\Phi_B}{\mathrm{d}t}$$
$$\Phi_B = \int \mathbf{B}\cdot\mathrm{d}\mathbf{a} \quad \nabla\times\mathbf{E} = -\frac{\partial\mathbf{B}}{\partial t}$$
$$\oint \mathrm{d}\boldsymbol{\ell}\cdot\mathbf{E} = -\frac{\mathrm{d}}{\mathrm{d}t}\int \mathrm{d}\mathbf{a}\cdot\mathbf{B} = -d\Phi_B/dt$$
$$\nabla\times\mathbf{B} = \mu_0\mathbf{J} + \mu_0\epsilon_0\frac{\partial\mathbf{E}}{\partial t}$$
$$\oint \mathbf{B}\cdot\mathrm{d}\boldsymbol{\ell} = \mu_0 I_{enc} + \mu_0\epsilon_0\int\frac{\partial\mathbf{E}}{\partial t}\cdot\mathrm{d}\mathbf{a}$$

$$\lim_{\mathbf{r}\to\infty} A \neq 0:$$
$$\oint \mathbf{A}\cdot\mathrm{d}\boldsymbol{\ell} = \int \mathbf{B}\cdot\mathrm{d}\mathbf{a}$$
$$\rho, \mathbf{J} = 0:$$
$$\mathbf{E} \to \frac{1}{\sqrt{\epsilon_0\mu_0}}\mathbf{B}$$
$$\mathbf{B} \to -\sqrt{\epsilon_0\mu_0}\mathbf{E}$$