Варианты заданий по набору формул

(в каждом варианте 7 формул)

вариант 1

$$I_{n+2} = \sigma^3 \frac{dI_n}{d\sigma}.$$

$$F(z) = \sqrt{\frac{2}{\pi}} \int_0^z e^{-t^2/2}\, dt$$

$$m - M = \frac{1}{D} \sum \xi_i (y_i - Y_i) = \frac{1}{D} \sum \xi_i e_i,$$

$$g(U_{nl}) = \frac{1}{U_{nl}} \left(\frac{U_{nl} - 1}{U_{nl} + 1} \right)^{3/2} \left[1 + \frac{2}{3} \right] \left(1 - \frac{1}{2U_{nl}} \right) \ln \left[27 + (U_{nl} - 1)^{1/2} \right]$$

$$\overline{A_x^2} = A_{xi}^2 \frac{\gamma_i}{\gamma} e^{-2\int_0^{\vartheta} \zeta_x \, d\vartheta} + \frac{55}{24\sqrt{3}} \frac{r_e \Lambda F}{\gamma} \int_0^{\vartheta} \gamma^6 \exp\left[-2 \int_{\vartheta'}^{\vartheta} \zeta_x \, d\vartheta'' \right] d\vartheta',$$

$$\mu = E_F \left[1 - \frac{\pi^2}{12} \left(\frac{kT}{E_F} \right)^2 \right]$$

$$\mathscr{K}_{\mathrm{I}} = -\frac{E_k^2}{2\omega_k} \left(\frac{\partial^2 \omega}{\partial E^2} \right)_k = \frac{\alpha}{1 - \alpha}$$

вариант 2

$$\mu_1 = IA = -\frac{e}{\tau}\pi R^2.$$

$$w_a(n) = \frac{a^n}{n!}\lim\frac{N(N-1)\ldots(N-n+1)}{N^n}q^{N-n}.$$

$$\sigma_{nl}E_{nl}^2 = \frac{a_{nl}Z_{nl}}{U_{nl}}\ln U_{nl}\{1-b_{nl}\exp[-c_{nl}(U_{nl}-1)]\}$$

$$\sigma_m \approx \left[\frac{\sum d_i^2}{n(n-1)}\right]^{1/2},$$

$$(\Delta\mu)^2 = (\Delta\mu_A)^2 + (\Delta\mu_D)^2,$$

$$X(\vartheta) = \begin{pmatrix} x(\vartheta) \\ x'(\vartheta) \\ z(\vartheta) \\ z'(\vartheta) \end{pmatrix},$$

$$\frac{1}{\sigma^3}\int x^{n+2}e^{-x^2/2\sigma^2}\,dx,$$

вариант 3

$$L = mvR = \frac{2\pi m R^2}{\tau}.$$

$$X_i = \frac{I_i / S_i}{\sum_{j=1}^{n} I_j / S_j} = \left(\frac{I_1}{I_i}\frac{S_i}{S_1} + \frac{I_2}{I_i}\frac{S_i}{S_2} + \frac{I_3}{I_i}\frac{S_i}{S_3} + \ldots + \frac{I_n}{I_i}\frac{S_i}{S_n} \right)^{-1}$$

$$\sigma \approx \frac{5}{4} \frac{\sum |d_i|}{n - {}^1/_2}.$$

$$\overline{E}_{н.к} = \hbar\omega \left(e^{\frac{\hbar\omega}{kT}} - 1 \right)^{-1}$$

$$\frac{d^2\psi}{dx^2} + \frac{2m}{\hbar^2} E\psi = 0$$

$$\Omega_0 = \left[\frac{2qeV\omega_s^2 \mathscr{K}_1 \frac{dE_s}{dt} \sin\varphi_s}{9\pi E_s^2} \right]^{1/3}$$

$$\tau = \frac{2\dot{\varphi}_{\max} P(\varphi_s)}{\left| \frac{d\omega_0}{dt} \right|} = \frac{2}{\left| \frac{d\omega_0}{dt} \right|} \sqrt{\frac{2eV_0\left(\omega_c^2 + hc^2\right)}{\pi E_0}} L(\varphi_s)$$

вариант 4

$$\mu_1 = -\frac{e}{2m}\mathbf{L}.$$

$$W(b) = \int_0^b \int_0^{2\pi} e^{-r^2} r^2\, dr\, d\theta = \pi\left(1 - e^{-b^2}\right).$$

$$U(L_1, L_2) = \frac{1}{2}\left(E_{L2}^{Z+1} - E_{L2}^{Z} + E_{L1}^{Z+1} - E_{L1}^{Z}\right)$$

$$(\Delta c)^2 \approx \left(\frac{1}{n} + \frac{\bar{x}^2}{D}\right)\frac{\sum d_i^2}{n-2}.$$

$$a = \frac{dv}{dt} = \frac{1}{\hbar}\ \frac{d}{dt}\left(\frac{dE}{dk}\right) = \frac{1}{\hbar}\ \ \frac{d^2 E}{dk^2}\ \frac{dk}{dt}$$

$$\overline{A^2_{\text{возм}}}(t) \approx A^2(t)\left[1 + \pi\int_0^t \frac{\Phi(\Omega)}{A^2(t)\,\Omega^2}\,dt\right]$$

$$w^{1/4} = (\Omega_0\tau)^{1/4} = \left[\frac{\Omega_0 \mathscr{K}(\tau)\, 2\pi E_s}{\mathscr{K}_1 e V \omega_s \cos\varphi_s}\right]^{1/4}$$

вариант 5

$$\frac{mv_\perp^2}{R} = Bev_\perp$$

$$\int\limits_{-\infty}^{\infty} e^{-x^2/2\sigma^2}\,dx = \sqrt{2}\,\sigma \int\limits_{-\infty}^{\infty} e^{-y^2}\,dy,$$

$$(\Delta m)^2 \approx \frac{1}{D}\,\frac{\sum d_i^2}{n-2},$$

$$d = \frac{a}{\sqrt{h^2+k^2+l^2}},$$

$$dz = g(\omega)\,d\omega = \frac{3V}{2\pi^2 v^3}\,\omega^2\,d\omega.$$

$$\frac{\Delta E}{E_s} = \frac{1}{q\omega_s\mathscr{K}}\,\frac{d\eta}{d\tau} = \frac{\Omega}{q\omega_s\mathscr{K}}\,\frac{d\eta}{dw} = \frac{\Omega}{q\omega_s\mathscr{K}}\,w^{2/3}\left[C_1 J_{-1/3}(w) - C_2 J_{1/3}(w)\right]$$

$$\varkappa^2 = \frac{96eVG_s(\sin\varphi_s - \varphi_s\cos\varphi_s)\,K_0^2}{55\pi\sqrt{3}\,\hbar c\alpha q\langle K^3\rangle\gamma^3}.$$

вариант 6

$$\omega_c = \frac{v_\perp}{R} = \frac{eB}{m}.$$

$$\int_0^\infty x e^{-x^2/2\sigma^2}\, dx = 2\sigma^2 \int_0^\infty y e^{-y^2}\, dy$$

$$(\Delta c)^2 = (\Delta b)^2 + \bar{x}^2 (\Delta m)^2 = \\ = \left(\frac{1}{n} + \frac{\bar{x}^2}{D}\right)\sigma^2$$

$$m = \frac{\sum x_i y_i}{\sum x_i^2},$$

$$g = 2\left[1 + \frac{\alpha}{2\pi} + O\left(\frac{\alpha^2}{\pi^2}\right)\right]$$

$$\overline{\frac{d\,|C|^2}{dt}} \approx \frac{\pi}{4\,|a|^2}\,\frac{\Phi(\Omega)}{\Omega^2}$$

$$\tau \frac{d}{d\tau}\left[\frac{1}{\tau}\,\frac{d\eta}{d\tau}\right] + \frac{\tau q e V \omega_s^2 \mathcal{K}_1 \dfrac{dE_s}{dt} \sin\varphi_s}{2\pi E_s^2}\,\eta = -\,\tau \frac{d}{d\tau}\left[\frac{1}{\tau}\,\frac{d\varphi_s}{d\tau}\right]$$

вариант 7

$$\frac{d}{d\sigma}\int x^n e^{-x^2/2\sigma^2}\,dx$$

$$\langle s^4\rangle = \left(1-\frac{1}{n}\right)\left\{\left(\frac{1}{n}-\frac{1}{n^2}\right)\langle e^4\rangle + \left(1-\frac{2}{n}+\frac{3}{n^2}\right)\langle e^2\rangle^2\right\}$$

$$\rho = \frac{S_1+S_2}{2\bar{r}} + \Delta\theta^2$$

$$I_B = I_B^\infty[1-\exp(\frac{-t}{\lambda_B(E_B)\cos\Theta})],$$

$$\frac{\sum (1/\Delta z_i)^2 z_i}{\sum (1/\Delta z_i)^2} \pm \frac{1}{[\sum (1/\Delta z_i)^2]^{1/2}}.$$

$$\frac{\partial \mathcal{E}_\tau}{\partial \rho} + \frac{1}{c}\left[\tau\,\frac{\partial h}{\partial t}\right] = K_0\,\frac{\partial \mathcal{E}_\perp}{\partial \vartheta}$$

$$\left(\frac{\overline{dA_x^2}}{d\vartheta}\right)_{\text{кв}} = \frac{55}{24\sqrt{3}}\,r_e \Delta F \gamma^5,$$

вариант 8

$$\varepsilon(r) = \frac{r_a r_b V_{ab}}{r^2 (r_b - r_a)}$$

$$\Delta\varphi_s \approx \frac{F(t)}{\Omega^2}$$

$$w_N(n) = \frac{N!}{n!(N-n)!} p^n q^{N-n}.$$

$$I_2 = \frac{\Delta E^2}{4}\frac{dN(E_s)}{dE} + \frac{\Delta E^4}{48}\frac{d^3 N(E_S)}{dN^3} + \frac{\Delta E^6}{1536}\frac{d^5 N(E_S)}{dN^5} + \ldots$$

$$(\Delta m)^2 \approx \frac{1}{D}\frac{\sum d_i^2}{n-2},$$

$$\overline{E} = \frac{E_{\text{п}}}{N} = \int_0^\infty \frac{E^{3/2}\,dE}{e^{\frac{E-\mu}{kT}}+1}\left(\int_0^\infty \frac{E^{1/2}\,dE}{e^{\frac{E-\mu}{kT}}+1}\right)^{-1}$$

$$\frac{d}{dt}\left[\frac{E_s\,d\varphi/dt}{\mathscr{K}\omega_s^2}\right] = \frac{qeV}{2\pi}\left[U(E_s, \varphi) - U(E_s, \varphi_s)\right],$$

вариант 9

$$E_0 = \frac{eV_{ab}}{0{,}77 \ln(r_b/r_a)}$$

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

$$\sigma \approx \frac{5}{4} \frac{\sum |d_i|}{n - 1/2}$$

$$E_{\text{реш}} = \frac{3\pi^4}{5} Nk\Theta \left(\frac{T}{\Theta}\right)^4 \sim T^4$$

$$\Delta E_s = \frac{E_s}{\mathscr{K}} \left[\frac{\Delta\omega_0}{\omega_0} - \alpha \frac{\Delta \langle B_z \rangle_s}{\langle B_z \rangle_s} \right].$$

$$\frac{d\eta}{dt} = ia(t)\,\Omega(t)\,C \exp\left[i \int \Omega\, dt \right] + \text{к. с.}$$

$$\tau = \frac{8\pi^2 N_0 Z^2 e^4 \langle |f|^2 \rangle |f|^2_{\max} \lg\left(183 Z^{-1/3}\right)}{K_0^3 A^2_{\text{доп}}\, eV \cos\varphi_s} \int_{E_{\text{inj}}}^{E} \frac{dE}{E^2 \beta^4} \approx$$

$$\approx \frac{2\pi^2 N_0 Z^2 e^4 \langle |f|^2 \rangle |f|^2_{\max} \lg\left(183 Z^{-1/3}\right)}{K_0^3 A^2_{\text{доп}}\, eV \cos\varphi_s W_{\text{inj}}}$$

вариант 10

$$\omega'_p = \sqrt{\frac{e^2 n}{m_e^* \varepsilon_r \varepsilon_0}}$$

$$\int_{-\infty}^{\infty} x^4 e^{-x^2/2\sigma^2} dx = 3\sqrt{2\pi}\sigma^5$$

$$r = \frac{1}{n} \sum |d_i|.$$

$$\frac{d\ln(T_{\max}^2 dt/dT)}{d(1/T_{\max})} = \frac{E_d}{R}$$

$$\Delta\nu_{x,z} \approx \pm \frac{1}{2} \frac{\Delta p}{p} \left\langle |f_{x,z}|^2 \left(n + n_1 \frac{K\psi}{K_0}\right) \right\rangle$$

$$\frac{d}{dt}\left(m \frac{d\boldsymbol{r}}{dt}\right) = \frac{e}{c}\left[\frac{d\boldsymbol{r}}{dt} \boldsymbol{B}(\boldsymbol{r}, t)\right] + e\boldsymbol{\mathcal{E}}(\boldsymbol{r}, t),$$

$$\overline{A_x^2} = A_{xi}^2 \frac{\gamma_i}{\gamma} + \frac{55}{24\sqrt{3}} \frac{r_e \Lambda F}{\gamma} \int_0^{\vartheta} \gamma^6(\vartheta')\, d\vartheta'.$$

вариант 11

$$r = \frac{3{,}51 \cdot 10^{22}\ P}{\sqrt{TM}}$$

$$\frac{1}{\sqrt{2\pi}} \frac{1}{\sigma} \int\limits_{-\infty}^{\infty} x^2 e^{-x^2/2\sigma^2}\, dx = \sigma^2.$$

$$-\frac{dn}{dt} = n^{+} \nu_{+} \exp\left(-\frac{E_d}{RT}\right)$$

$$(\Delta c)^2 \approx \left(\frac{1}{n} + \frac{\bar{x}^2}{D}\right) \frac{\sum d_i^2}{n-2},$$

$$g(p)\, dp = \frac{4\pi V}{h^3}\, p^2\, dp$$

$$N(v)\, dv = 4\pi N \left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} e^{-\frac{mv^2}{2kT}} v^2\, dv$$

$$W(\varphi) = -\frac{qeV}{2\pi} \int (\cos\varphi - \cos\varphi_s)\, d\varphi = -\frac{qeV}{2\pi} (\sin\varphi - \varphi\cos\varphi_s).$$

вариант 12

$$\frac{\langle s^2\rangle^{1/2}}{\langle r\rangle}=\sqrt{\frac{\pi}{2}}.$$

$$-\frac{dE}{dz}=\frac{\omega_p^2 e^2}{\upsilon^2}\ln\frac{2m\upsilon^2}{\hbar\omega_p},$$

$$\varepsilon=\frac{xN_{\text{сл}}}{r_0 N_{\text{сл}}}=\frac{\Delta L}{L},$$

$$S=\int_{-\pi/2}^{\pi/2} p(\theta_a,\theta_b)d\theta_a d\theta_b\left\{\cos\left[2(\phi_1^a-\theta_a)\right]\cos\left[2(\phi_3^b-\theta_b)\right]\right\}$$

$$\sum_j \varepsilon_j^2\bar{n}_j\approx\int_0^\infty\frac{\hbar\omega_c}{cK_0}uU(u)\,du;$$

$$N(\tau)\approx\exp\left[-\int_0^\tau\rho^{-4}(\tau)\,e^{-\rho^{-2}(\tau)}\,d\tau\right]$$

$$\varkappa^2=\frac{1}{\bar{g}}\approx\frac{4(\sin\varphi_s-\varphi_s\cos\varphi_s)}{(\varphi_0-\varphi_s)^2\sin\varphi_s}=\frac{\eta_{\text{доп}}^2}{(\overline{A_\eta^2})_{\text{уст}}}.$$

вариант 13

$$\sigma_m = \sqrt{\frac{\pi}{2}} \frac{\langle r \rangle}{(n-1)^{1/2}}.$$

$$s^2 = \left(\frac{1}{n} - \frac{1}{n^2}\right) \sum e_i^2 - \frac{1}{n^2} \sum_{\substack{i \\ i \neq j}} \sum_{j} e_i e_j$$

$$U(x) \approx \frac{1}{2} \left(\frac{\partial^2 U}{\partial r^2}\right)_0 x^2 = \frac{1}{2} \beta x^2,$$

$$\overline{E} = \frac{\int_0^\infty EN(E)\, dE}{\int_0^\infty N(E)\, dE}$$

$$u = \frac{\Delta E}{E_s} \left[\frac{\pi q \mathscr{K}_1 E_s}{3eV} \right]^{1/2}$$

$$-\frac{1}{2} \left\langle \frac{K^2}{K_0^2} \right\rangle < \left\langle \frac{K^3(\vartheta)}{K_0^3} \psi(\vartheta) \left[n(\vartheta) - \frac{1}{2} \right] \right\rangle < \left\langle \frac{K^2}{K_0^2} \right\rangle$$

$$\sum_j \varepsilon_j^2 \overline{n}_j = \frac{55}{24\sqrt{3}} \frac{e^2 \hbar c K^3}{K_0} \gamma^7.$$

вариант 14

$$s^2 = \frac{1}{n}\sum e_i^2 - \frac{1}{n^2}\left(\sum e_i\right)^2$$

$$\Delta R = -\frac{R}{1-n}\cdot\frac{\Delta W_{об}}{E},$$

$$\sigma_m \approx \frac{5}{4}\,\frac{r}{(n-1)^{1/2}}.$$

$$\overline{M} = \frac{\int\limits_0^\infty MN(M)\,dM}{\int\limits_0^\infty N(M)\,dM}$$

$$\frac{\Delta\omega_0}{\omega_0} \ll \left[\frac{eV\cos\varphi_s}{3\pi E_s}\right]^{2/3}\left[\frac{\alpha q}{1-\alpha}\,|\operatorname{tg}\varphi_s|\right]^{1/3}$$

$$N(t) = \int\limits_0^{y_{\max}} dy\cdot\exp\left[-\int\limits_0^t P(y,\,t)\,dt\right]Y_0(y).$$

$$\frac{d^2 z}{dk^2} + \pi^2\left[n_{эл}(k) + n(k)\right]z = 0.$$

вариант 15

$$U = U_s + \Delta U \sin \omega t$$

$$\sum_{n=0}^{\infty} w_a(n) = e^{-a} \sum_{n=0}^{\infty} \frac{a^n}{n!} = e^{-a} e^{a} = 1.$$

$$\bar{v}_x = \left(\frac{kT}{2\pi m}\right)^{1/2};$$

$$\frac{dI_K(U_S)}{dU_s} = \frac{i}{\sigma\sqrt{2\pi}} \exp\left(\frac{-U_S^2}{2\sigma^2}\right)$$

$$\int_0^{\omega_Д} g(\omega)\, d\omega = 3N$$

$$\varepsilon = \frac{\mathscr{K}}{\mathscr{K}_1} \left[\frac{9\pi q \mathscr{K}_1 E_s}{4eV}\right]^{1/3} \approx \left[\frac{9\pi q \alpha}{4eVE_k^2(1-\alpha)}\right]^{1/3} (E_s - E_k),$$

$$z = \mathrm{const}\left(\frac{W}{\sin\varphi}\right)^{1/4} \sin\left[\pi^{1/2} \int_0^k \left(\frac{eV_0 \sin\varphi}{W}\right)^{1/2} dk + \delta\right].$$

вариант 16

$$f(z)=\frac{1}{\sqrt{2\pi}}\,e^{-z^2/2};$$

$$w_a(n)=\lim_{N\to\infty}\frac{N!}{n!\,(N-n)!}\,p^n q^{N-n}$$

$$E_{\text{реш}}=9Nk\Theta\left(\frac{T}{\Theta}\right)^4\int\limits_0^{\Theta/T}\frac{x^3\,dx}{e^x-1},$$

$$\mathscr{K}(t)\approx\left.\frac{d\mathscr{K}}{dt}\right|_k(t-t_k)=\frac{\mathscr{K}_1}{E_k}\left.\frac{dE_s}{dt}\right|_k\tau,$$

$$E_i=E_i^0+kq_i+\sum_{i\neq j}\frac{q_i}{r_{ij}},$$

$$\frac{W}{m_0c^2}=2\left(\sqrt{1+\frac{W_1'}{2m_0c^2}}-1\right)$$

$$\dot{\varphi}_{\max}=\sqrt{2\left|\frac{d\omega_0}{dt}\right|\frac{F(\varphi_s)}{|\cos\varphi_s|}},$$

вариант 17

$$\eta = w^{2/3}\left[C_1 J_{2/3}(w) + C_2 J_{-2/3}(w)\right],$$

$$\frac{1}{D}\left\langle\left(\sum \xi_l e_l\right)^2\right\rangle = \frac{1}{D}\left\langle\sum \xi_l^2 e_l^2\right\rangle = \sigma^2.$$

$$\mathbf{I}_i(\Theta) = \frac{\mathbf{F}_i}{\sigma_i^n}\frac{\mathbf{d}\sigma_i}{\mathbf{d}\Omega}\int_0^\infty \mathbf{B}(\mathbf{t})\mathbf{N}_i(\mathbf{t}) \times \mathbf{exp}(-\mathbf{t}/\mathbf{cos}\,\Theta)\mathbf{dt},$$

$$\overline{E} = \frac{3}{5}E_F\left[1 + \frac{5\pi^2}{12}\left(\frac{kT}{E_F}\right)^2\right]$$

$$U^2 = \int_{-a}^{a} e^{-x^2}\,dx$$

$$\frac{dC}{dt} = \frac{F_{\Omega'}\sin(\Omega' t + \gamma)}{2ia(t)\,\Omega(t)}\exp\left[-i\int \Omega\,dt\right],$$

$$E = \sqrt{2}m_0c^2\left\{1 + \gamma_1'\gamma_2' + \left(\gamma_1'^2 - 1\right)^{\frac{1}{2}}\left(\gamma_2'^2 - 1\right)^{\frac{1}{2}}\right\}^{\frac{1}{2}},$$

вариант 18

$$\operatorname{rot} \mathcal{E} = -\frac{1}{c} \frac{\partial h}{\partial t}$$

$$g(\omega) = \frac{dz}{d\omega} = \frac{3V}{2\pi^2 v^3} \omega^2$$

$$U^2 = \int_{-a}^{a} \int_{-a}^{a} e^{-(x^2+y^2)} \, dx \, dy.$$

$$\overline{E}_{н.к} \approx \hbar\omega \left(1 + \frac{\hbar\omega}{kT} + \dots - 1\right)^{-1} \approx kT.$$

$$\sum d_i^2 = \sum e_i^2 - \frac{1}{D}\left(\sum \xi_i e_i\right)^2 - \frac{1}{n}\left(\sum e_i\right)^2$$

$$\Delta a = a(t)(C-1) = -a(t) \int_{-\infty}^{t} \frac{F_{\Omega'} \exp\left[-i\left(\frac{d\Omega}{dt}\right)' \frac{\tau^2}{2} + i\chi\right] d\tau}{4a(\tau)\,\Omega(\tau)}$$

$$N(v_x, v_y, v_z)\, dv_x\, dv_y\, dv_z =$$
$$= N\left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} e^{-\frac{m\left(v_x^2 + v_y^2 + v_z^2\right)}{2kT}} dv_x\, dv_y\, dv_z$$

вариант 19

$$\Delta E_i = q\left(\frac{1}{r_v} - \frac{\alpha}{R}\right)$$

$$m = \frac{1}{D} \sum (x_i - \bar{x})\, y_i,$$

$$dA = Fvdt = \frac{F}{\hbar}\ \frac{dE}{dk}\, dt$$

$$f(E) = \frac{1}{e^{\frac{\varepsilon_\Phi}{kT}} - 1} = \frac{1}{e^{\frac{\hbar\omega}{kT}} - 1}$$

$$N(v_x,\ v_y,\ v_z)\, dv_x\, dv_y\, dv_z =$$

$$= N\left(\frac{m}{2\pi kT}\right)^{\frac{3}{2}} e^{-\frac{m\left(v_x^2 + v_y^2 + v_z^2\right)}{2kT}}\, dv_x\, dv_y\, dv_z$$

$$(\eta)_{\tau \to 0} \to C_2 \frac{2^{2/3}}{\Gamma\left(\frac{1}{3}\right)}$$

$$n_1 = \frac{R^2}{B}\left(\frac{d^2B}{dr^2}\right)_{r=R} = \left(n^2 + n - r\,\frac{dn}{dr}\right)_{r=R}$$

вариант 20

$$r_0 = \frac{2r_a r_b}{r_a + r_b}$$

$$s^2 = \frac{1}{n}\sum (x_i - \overline{x})^2 = \frac{1}{n}\sum (e_i - E)^2$$

$$\overline{E} = \frac{2}{\sqrt{\pi (kT)^3}} \int_0^\infty e^{\frac{-E}{kT}} E^{\frac{3}{2}}\, dE = \frac{3}{2} kT$$

$$\lambda_i = 538 E_i^{-2} N^{-1/3} + 0{,}41 E_i^{1/2} N^{-1/2}$$

$$\left(\frac{\Delta E}{E_s}\right)_{\tau \to 0} \to C_1 \left[\frac{\operatorname{tg} \varphi_s \Omega_0}{q \mathcal{K}_1 \omega_s}\right]^{1/2} \frac{2^{1/3}}{\Gamma\left(\frac{2}{3}\right)}$$

$$\alpha = \frac{1}{r_0} \frac{d\overline{x}}{dT} = \frac{g}{\beta^2 r_0} \frac{dE}{dT} = \chi c v$$

$$T_{\text{рез}} \approx 4\pi \sqrt{2n}\, (1 - n)\, T \sqrt{\frac{W}{R\left(\frac{dn}{dr}\right)_R \Delta W}}\,,$$

вариант 21

$$E = \frac{eV_{ab}r_a r_b}{2r_0\left(r_b - r_a\right)}$$

$$m = \frac{1}{D_w}\sum w_i\,(x_i - \bar{x})\,y_i,$$

$$g(E)\,dE = \frac{2\pi V}{h^3}(2m)^{3/2}\sqrt{E}\,dE$$

$$\eta \approx w^{1/6}\sqrt{\frac{2}{\pi}}\left[C_1\sin\left(\int_0^{\tau}\Omega\,d\tau - \frac{\pi}{12}\right) + C_2\cos\left(\int_0^{\tau}\Omega\,d\tau + \frac{\pi}{12}\right)\right]$$

$$\frac{dE}{dt} = e\mathcal{E}(\boldsymbol{r},\ t)\,\frac{d\boldsymbol{r}}{dt}$$

$$\mu_1 = IA = -\frac{e}{\tau}\pi R^2.$$

$$\mathcal{H} = -\frac{eV}{2\pi}(\sin\varphi - \varphi\cos\varphi_s) + \frac{q\omega_s^2\mathcal{K}}{E_s}\frac{1}{2}\left(\frac{\Delta E}{\omega_s}\right)^2 + \frac{q\,\omega_s^3\mathcal{K}_1}{3E_s^2}\left(\frac{\Delta E}{\omega_s}\right)^3 + \ldots,$$

вариант 22

$$x=\frac{2\mu_p B}{kT}=\frac{\hbar\gamma_p B}{kT}.$$

$$\frac{\sigma}{\rho}=\sqrt{\frac{\pi}{2}}=1{,}253.$$

$$I_K(E)=\int_{E_s}^{E_p} N(E)dE$$

$$\bar{y}=\frac{\sum w_i y_i}{\sum w_i},$$

$$\frac{N(N-1)\dots(N-n+1)}{N^n}\rightarrow 1.$$

$$\frac{d}{d\vartheta}\overline{A_x^2}=\frac{55}{24\sqrt{3}}r_e\Lambda F\gamma^5-\overline{A_x^2}\left[2\langle\zeta_x\rangle+\frac{d\ln\gamma}{d\vartheta}\right]$$

$$f_\Phi(E)=\left[e^{\frac{E-E_F}{kT}}+1\right]^{-1}$$

вариант 23

$$\frac{1}{2}mv^2 = \frac{3}{2}kT,$$

$$\sigma_{nl} = \frac{\pi e^4 Z_{nl}}{E \cdot E_{nl}} b_{nl} \ln\left(c_{nl}\frac{E}{E_{nl}}\right)$$

$$c_i(t) = \frac{N_i(t)/\sigma_i^n}{\sum_j N_j(t)/\sigma_j^n} \times 100.$$

$$\left(\overline{A_x^2}\right)_{\text{уст}} = \frac{55\sqrt{3}}{48}\frac{\Lambda F \gamma^2}{K_0 G_x},$$

$$I_K = I_0 + I_1 \sin\omega t + I_2 \sin 2\omega t + I_3 \sin 3\omega t + \cdots$$

$$\overline{A_\eta^2} = \frac{55\pi}{12\sqrt{3}} e\Lambda q\alpha \frac{\langle K^3\rangle}{K_0} (V\sin\varphi_s)^{-0,5}\gamma^{-0,5}\int_0^\vartheta \gamma^{6,5}(V\sin\varphi_s)^{-0,5} \times$$
$$\times \exp\left(-2\int_{\vartheta'}^{\vartheta}\langle\zeta_s(\vartheta'')\rangle\, d\vartheta''\right) d\vartheta'.$$

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

вариант 24

$$F_p = -eE = -\frac{eP}{m\varepsilon_0} = -\frac{e^2 n}{m\varepsilon_0}x \qquad \omega_p = \sqrt{\frac{e^2 n}{m\varepsilon_0}}$$

$$(\Delta m)^2 \approx \frac{1}{\sum x_i^2} \frac{\sum d_i^2}{n-1},$$

$$\Delta a \approx -\frac{a(t)}{4a'\Omega'}\left[\frac{\pi}{|d\Omega/dt|'}\right]^{1/2} \exp\left[-i\left(\chi \pm \frac{\pi}{4}\right)\right],$$

$$\delta A_{\eta}^2 = -\frac{2q\alpha}{\nu_s^2}\frac{\varepsilon}{E}\eta' + \frac{q^2\alpha^2}{\nu_s^2}\frac{\varepsilon^2}{E^2} + \ldots$$

$$\frac{d\overline{A_{\eta}^2}}{d\vartheta} = \frac{55\pi}{12\sqrt{3}}\frac{\alpha q e \Lambda \langle K^3\rangle}{K_0 V \sin\varphi_s}\gamma^6 - \overline{A_{\eta}^2}\left[2\langle\zeta_s\rangle + \frac{1}{2}\frac{d\ln\gamma V\sin\varphi_s}{d\vartheta}\right].$$

$$F(z) = \sqrt{\frac{2}{\pi}}\int_0^z e^{-t^2/2}\,dt$$

вариант 25

$$\varepsilon(r) = \frac{V_{ab}}{r \ln(r_b / r_a)}$$

$$y = y_1 + y_2 = A(\cos 2\pi\nu_1 t + \cos 2\pi\nu_2 t)$$

$$\int_0^t \frac{R}{1-n} \frac{\Delta W_{\text{об}\omega}(E)}{2\pi} dt < \Delta R_{\max}$$

$$\int_0^\infty \frac{x^3\, dx}{e^x - 1} = \frac{\pi^4}{15},$$

$$(\Delta c)^2 \approx \left(\frac{1}{\sum w_i} + \frac{\bar{x}^2}{D_w}\right) \frac{\sum w_i d_i^2}{n-2},$$

$$p = 0{,}17 W_{\text{inj}} e V \cos\varphi_s \tau \frac{A_{\text{доп}}^2}{R^3 \langle |f|^2 \rangle |f|_{\max}^2}$$

$$\frac{dN}{d\tau} = N\left(\frac{\partial U}{\partial u}\right)_{u=1} = -\frac{N}{\rho^4(\tau)} e^{-\frac{1}{\rho^2(\tau)}}$$

вариант 26

$$\frac{\sigma}{\rho}=\sqrt{\frac{\pi}{2}}=1{,}253.$$

$$(\Delta m)^2 \approx \frac{1}{D}\frac{\sum d_i^2}{n-2},$$

$$y = 2A\cos 2\pi\frac{\nu_1-\nu_2}{2}t\cos 2\pi\frac{\nu_1+\nu_2}{2}t.$$

$$\rho=\int\limits_{-\pi/2}^{\pi/2} p(\theta_a,\theta_b)|\theta_a\rangle\langle\theta_a|\otimes|\theta_b\rangle\langle\theta_b|d\theta_a d\theta_b$$

$$\Delta A_{\max}=\frac{\omega_0}{\Omega}\left|\alpha\frac{\Delta\langle B_z\rangle_s}{\langle B_z\rangle_s}-\frac{\Delta\omega_0}{\omega_0}\right|+\left|\frac{\Delta V}{V}\operatorname{ctg}\varphi_s\right|$$

$$\eta^2_{\text{доп}}=\frac{4(\sin\varphi_s-\varphi_s\cos\varphi_s)}{\sin\varphi_s},$$

$$\overline{E}=\frac{\int\limits_0^\infty EN(E)\,dE}{\int\limits_0^\infty N(E)\,dE}.$$

вариант 27

$$r = P\sqrt{\left(\frac{1}{2\pi k_B T m}\right)} \qquad \mu = \frac{\sin {}^1/_2(A+D)}{\sin {}^1/_2 A}.$$

$$\int_0^\infty \frac{x^3\,dx}{e^x-1} = \frac{\pi^4}{15},$$

$$\sum_{n=0}^{N} w_N(n) = g(1) = (q+p)^N = 1$$

$$I_1 = \Delta E N(E_S) + \frac{\Delta E^3}{8}\frac{d^2 N(E_S)}{dN^2} + \frac{\Delta E^5}{192}\frac{d^4 N(E_S)}{dN^4} + \ldots$$

$$\frac{d^2 z}{dk^2} + \frac{\pi e V_0 \sin\varphi}{W} z = 0$$

$$\mathbf{I}_{\mathrm{i}}(\Theta) = \frac{\mathbf{F}_{\mathrm{i}}}{\sigma_{\mathrm{i}}^{\mathrm{n}}}\frac{\mathbf{d}\sigma_{\mathrm{i}}}{\mathbf{d}\Omega}\int_0^\infty \mathbf{B}(\mathbf{t})\mathbf{N}_{\mathrm{i}}(\mathbf{t}) \times \mathbf{exp}(-\mathbf{t}/\mathbf{cos}\,\Theta)\mathbf{dt},$$

вариант 28

$$\lambda = \frac{k_B T}{\sqrt{2}\pi d^2 P}$$

$$\Delta\mu_A = \left(\frac{\partial\mu}{\partial A}\right)\Delta A.$$

$$\langle n\rangle = \sum_{n=0}^{N} n w_N(n) = \left(\frac{dg}{dz}\right)_{z=1}$$

$$B_{\text{рез}}(r) \approx B_{\text{рез}}(0)\left[1 + \frac{1}{2}\left(\frac{r}{r_c}\right)^2 + \dots\right].$$

$$W_k = e^2 c K^2 \beta k \left[2\beta^2 J'_{2k}(2k\beta) - (1-\beta^2)\int_0^{2k\beta} J_{2k}(x)\,dx\right].$$

$$\mathfrak{g} = \frac{(\varphi_0 - \varphi_s)\cos\varphi_s - (\sin\varphi_0 - \sin\varphi_s)}{2(\sin\varphi_s - \varphi_s\cos\varphi_s)},$$

$$\frac{\Delta\omega_0}{\omega_0} \ll \left[\frac{eV\cos\varphi_s}{3\pi E_s}\right]^{2/3}\left[\frac{\alpha q}{1-\alpha}\,|\operatorname{tg}\varphi_s|\right]^{1/3}$$

вариант 29

$$\bar{v} = \left(\frac{8kT}{\pi m}\right)^{1/2};$$

$$U = U_s + \Delta U \sin \omega t$$

$$\langle n(n-1)\rangle = \sum_{n=0}^{N} n(n-1)\, w_N(n) = \left(\frac{d^2 g}{dz^2}\right)_{z=1}$$

$$\frac{\partial\mu}{\partial A} = \frac{1}{2}\,\frac{\cos {}^1/_2 (A+D)}{\sin A/2} - \frac{1}{2}\,\frac{\sin {}^1/_2 (A+D)}{\sin A/2 \operatorname{tg} A/2}$$

$$E_{\text{реш}} = \frac{9N}{\omega_{\text{Д}}^3} \int_0^{\omega_{\text{Д}}} \hbar\omega^3\, d\omega \left(e^{\frac{\hbar\omega}{kT}} - 1\right)^{-1}$$

$$s = -\frac{e\mathscr{E}_0}{m_0\omega\,\Delta\omega}\left\{\sin\left[\left(\omega + \frac{\Delta\omega}{2}\right)t + \varphi_i\right]\sin\frac{\Delta\omega t}{2} - \frac{1}{2}\,\frac{\Delta\omega}{\omega}\sin\omega t \sin\varphi_i\right\},$$

$$U(u) = \frac{3\sqrt{3}}{4\pi}\, e^2 c K^2 \gamma^4 u \int_u^{\infty} K_{5/3}(u')\, du'.$$

вариант 30

$$s^2=\frac{1}{n}\sum d_i^2.$$

$$\frac{d^2\psi}{dx^2}+\frac{2m}{\hbar^2}E\psi=0$$

$$\varepsilon=\frac{1}{2\pi}\arccos\left(\frac{\Delta\Phi}{\Phi_{\max}}-1\right).$$

$$B_{\text{рез}}(r)=\frac{B_{\text{рез}}(0)}{\sqrt{1-\left(\frac{r}{r_c}\right)^2}}$$

$$\dot{\varphi}_{\max}=\sqrt{\frac{2eV_0}{\pi E_0}\left(\omega_c^2+hc^2\right)F(\varphi_s)}\,,$$

$$\overline{A_x^2}=A_{xi}^2\,\frac{\gamma_i}{\gamma}\,e^{-2\int_0^{\vartheta}\zeta_x\,d\vartheta}+\frac{55}{24\sqrt{3}}\,\frac{r_e\Lambda F}{\gamma}\int_0^{\vartheta}\gamma^6\exp\left[-2\int_{\vartheta'}^{\vartheta}\zeta_x\,d\vartheta''\right]d\vartheta',$$

$$\lg\tau=\lg\tau_0+\frac{U_0-\gamma\sigma}{kT}=\lg\tau_0+\frac{U}{kT}$$