

5. Дано: $\rho = \frac{a}{r^2}$, S | ~~$\frac{R_1}{\rho}$~~ ? а) $\frac{R_1}{\rho}$ -? б) E -? при холостом I

$$а) \frac{R_1}{\rho} = \frac{\rho}{S} = \frac{\rho}{2\pi r dr}$$

$$\frac{\rho}{R_1} = \int_0^R \frac{2\pi r^3 dr}{a} = \frac{\pi R^4}{2a}$$

$$\Rightarrow \frac{R_1}{\rho} = \frac{2\pi a}{S^2} \frac{2\pi a}{\pi^2 R^4} = \frac{2\pi a}{S^2}$$

б) $\frac{dI}{ds} = \sigma E$

$$dI = \sigma E ds$$

$$I = \int dI = \int_0^R \frac{2\pi r^3 E}{a} dr = \frac{\pi R^4 E}{2a}$$

$$E = \frac{2\pi a I}{\pi^2 R^4} = \frac{2\pi a I}{S^2}$$

6. Дано: $R = 100 \Omega$, $t = 10c$, $I = I_0 + 0.7t$ | $I_0 = 1A$ | Q -?

$$Q = \int_0^{10} I^2 R dt$$

$$= \int_0^{10} 100 I_0^2 + 49 t^2 + 140 I_0 t dt$$

$$= \frac{100}{3} (100t + \frac{49}{3} t^3 + 70 t^2) \Big|_0^{10}$$

$$= 1000 + \frac{490000}{3} + 7000$$

$$\approx 24k \Omega$$