

Problema 13

$$b = \frac{a}{6}; \quad \varepsilon_r = 4$$

Problema 14

$$1) \quad Q = 6q$$

$$2) \quad \sigma_1 = \frac{4q}{S}; \quad \sigma_2 = \frac{2q}{S}$$

Problema 15

$$W = \frac{q^2}{16\pi\varepsilon_0 a} + 32\pi\varepsilon_0 a V_0^2$$

Problema 16

$$1) \quad V_B - V_A = \frac{\lambda}{2\pi\varepsilon_0} \left(\ln 2 - \frac{9}{8} \ln \frac{7}{5} \right)$$

$$2) \quad \left(\frac{81a}{5}, 0 \right), \left(\frac{81a}{13}, 0 \right)$$

Problema 17

$$1) \quad q = 3\pi\varepsilon_0 b V_0; \quad V_b = \frac{3}{4} V_0$$

$$2) \quad \sigma_{2b} = -\frac{3\varepsilon_0 V_0}{16b}; \quad \sigma_{3b} = -\frac{\varepsilon_0 V_0}{12b}$$

Problema 18

$$b = \frac{2a}{5}; \quad \sigma_{inf} = \frac{5q}{S}; \quad \sigma_{sup} = \frac{q}{S}$$

Problema 19

$$1) \quad V_a = \frac{5Q}{8\pi\varepsilon_0 a}$$

$$2) \quad V'_{4a} = \frac{15Q}{16\pi\varepsilon_0 a}$$

$$3) \quad (\Delta q)_a = 0; \quad (\Delta q)_{4a} = 10Q$$

Problema 20

$$1) \quad \vec{D}_{(r > a)} = -\frac{5\lambda}{2\pi r} \vec{u}_r; \quad \vec{D}_{(r < a)} = \frac{\lambda}{2\pi r} \vec{u}_r$$

$$2) \quad \sigma = -\frac{3\lambda}{\pi a}$$

$$3) \quad \omega_e = \frac{\lambda^2}{8\pi^2 \varepsilon_0 \varepsilon_r r^2}$$

Problema 21

1) $\sigma_2 = -3\sigma$

2) $\omega_e(x < 0) = \frac{\sigma^2}{2\varepsilon_0} = \omega_e(x > 3a); \quad \omega_e(0 < x < a) = \frac{2\sigma^2}{\varepsilon_0} = \omega_e(2a < x < 3a); \quad \omega_e(a < x < 2a) = 0$

3) $W = \frac{b\sigma}{2\varepsilon_0}(1 - \sqrt{2})$

Problema 22

1) $Q_2 = 3\pi\varepsilon_0 a V_0 + q$

2) $V_b = \frac{V_0}{4}$

3) $Q'_1 = \frac{-3\pi\varepsilon_0 a V_0}{2}; \quad Q'_2 = \frac{9\pi\varepsilon_0 a V_0}{2}$

Problema 23

1) $\sigma_a = \frac{6q_0}{\pi a^2}; \quad \sigma_{3a} = -\frac{2q_0}{3\pi a^2}; \quad \sigma_{4a} = -\frac{q_0}{4\pi a^2}$

2) $W = \frac{12q_0^2}{\pi\varepsilon_0 a}$

Problema 24

1) $\sigma_a = -\frac{5\lambda}{2\pi a}$

2) $W_l = \frac{6\lambda^2 \ln 2}{\pi\varepsilon_0}$

Problema 25

1) $\sigma = -\rho a$

2) $V_1 - V_2 = \frac{8\rho a^2}{\varepsilon_0}$