

Chapter 22 – Suggested problems

2, 8, 15, 24, 28, 30, 43, 61, 62, 65

Solutions of even suggested problems

(2) $E = 6.16 \text{ N m}^2/\text{C}$

- (8) (a) $\Phi = 452 \text{ Nm}^2/\text{C}$
(b) $\Phi = -881 \text{ Nm}^2/\text{C}$
(c) $\Phi = -429 \text{ Nm}^2/\text{C}$
(d) $\Phi = 723 \text{ Nm}^2/\text{C}$
(e) $\Phi = -158 \text{ Nm}^2/\text{C}$

(24) $E = 2.05 \times 10^5 \text{ N/C}$

- (28) (a) $E = 662 \text{ N/C}$
(b) $E = 6.75 \times 10^{-3} \text{ N/C}$
(c) No difference if sheet would be a conductor. The charge would automatically spread out evenly over both faces, giving it $\frac{1}{2}$ charge density on either face as in the insulator, but same electric field. Far away both look like points with same charge.

- (30) (a) $2.82 \times 10^5 \text{ N/C}$ left
(b) $3.95 \times 10^5 \text{ N/C}$ left
(c) $1.69 \times 10^5 \text{ N/C}$ left

(62)

$$\vec{E}_{\text{off-axis}} = \frac{\rho \vec{r}'}{2\epsilon_0} = \frac{\rho(\vec{r} - \vec{b})}{2\epsilon_0} \cdot \vec{E}_{\text{hole}} = \vec{E}_{\text{cylinder}} - \vec{E}_{\text{off-axis}} = \frac{\rho \vec{r}}{2\epsilon_0} - \frac{\rho(\vec{r} - \vec{b})}{2\epsilon_0} = \frac{\rho \vec{b}}{2\epsilon_0}$$