Chapter 21 - Electric Charge and Electric Field - Part 2

Physics 207

1) $x = (2 - \sqrt{2})d$

2) $\vec{E} = \frac{kq}{a^2}\left(\frac{4}{5\sqrt{5}} - \frac{1}{2\sqrt{2}}\right)\hat{\imath} + \frac{kq}{a^2}\left(\frac{2}{5\sqrt{5}} - \frac{1}{2\sqrt{2}}\right)\hat{\jmath}$

3a) $\vec{F} = -3.14\hat{x} - 4.90\hat{y}$

3b) $F = 5.01$ N at 78.0 degrees from $+\hat{x}$

3c) $\vec{E} = -35300\hat{x} - 83800\hat{y}$

4a) $\vec{E} = \frac{kQ}{2b}\int_{-b}^{b} \frac{ady}{(a^2 + (b-y)^2)^{3/2}}\hat{\imath} + \frac{kQ}{2b}\int_{-b}^{b} \frac{(b-y)dy}{(a^2 + (b-y)^2)^{3/2}}\hat{\jmath}$

4b) $\vec{F} = -\frac{kqQ}{b}\int_{-b}^{b} \frac{ady}{(a^2 + (b-y)^2)^{3/2}}\hat{\imath} - \frac{kqQ}{b}\int_{-b}^{b} \frac{(b-y)dy}{(a^2 + (b-y)^2)^{3/2}}\hat{\jmath}$

5) $\vec{E} = \frac{kQ}{\ell}\left[\frac{1}{\sqrt{(z_0 - \ell)^2 + R^2}} - \frac{1}{\sqrt{z_0^2 + R^2}}\right]\hat{z}$

6) $\vec{E} = -\frac{k\lambda_0\pi}{a}\hat{\jmath}$

7) $\vec{E} = \frac{kq}{d^2}\frac{\pi^2}{6}\hat{\imath}$