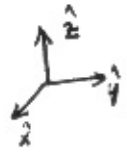
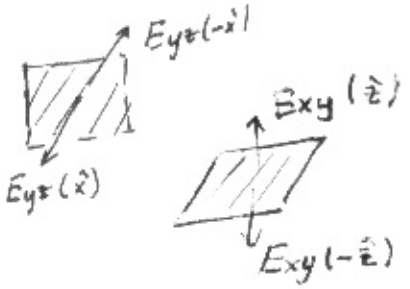
KEY to Quiz 2

(Phys 1304)

1-)





$\bar{E}_{xy} \perp \bar{E}_{yz}$

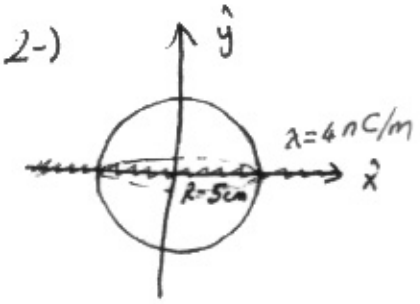
$$|\bar{E}| = \sqrt{E_{xy}^2 + E_{yz}^2}$$

$$|\bar{E}_{xy}| = \left| \frac{\sigma_{xy}}{2\epsilon_0} \right| = \left| \frac{0.3 \times 10^{-9}}{2 \times 8.85 \times 10^{-12}} \right| = 16.9$$

$$|\bar{E}_{yz}| = \left| \frac{\sigma_{yz}}{2\epsilon_0} \right| = \left| \frac{-0.4 \times 10^{-9}}{2 \times 8.85 \times 10^{-12}} \right| = 22.6$$

$$|\bar{E}| = \sqrt{16.9^2 + 22.6^2} \Rightarrow \boxed{|\bar{E}| = 28.2 \text{ N/C}}$$

2-)



$$\Phi = \oint \bar{E} \cdot d\bar{a} = \frac{q_{in}}{\epsilon_0} \Rightarrow \Phi = \frac{q_{in}}{\epsilon_0}$$

$$q_{in} = \lambda L = \lambda 2R = 2\lambda R$$

$$= 2 \times 4 \times 10^{-9} \times 5 \times 10^{-2}$$

$$= 4 \times 10^{-10}$$

$$\Phi = \frac{4 \times 10^{-10}}{8.85 \times 10^{-12}} = 45.2$$

$$\boxed{\Phi = 45.2 \text{ N/C m}^2}$$