Chapter 23

2. $\vec{F_6} = \dfrac{-k_e q_1 q_2}{r^2}$

$= -\dfrac{8.89\times10^{9} \times 5\times10^{-9} \times 6\times10^{-9}}{(0.3)^2}$

$= -3\times10^{-6}$ N

$\vec{F_3} = \dfrac{8.89\times10^{9} \times 5\times10^{-9} \times (-3)\times10^{-9}}{(0.1)^2}$

$= -1.35\times10^{-5}$ N

$|F| = \sqrt{(3\times10^{-6})^2 + (1.35\times10^{-5})^2}$

$\theta = \tan^{-1}\left(\dfrac{1.35\times10^{-5}}{1.35\times10^{-6}}\right)$

$= 77.5^\circ$ below x axis

OR $180 + 77.5^\circ = 257.5^\circ$

3. $E_R = \dfrac{k_e q}{r^2}$

$r = \sqrt{1 + (0.5^2)} = 1.12$

$E_R = \dfrac{8.99\times10^{9} \times 2\times10^{-6}}{1.25}$

$= 14400$ N/C

$E_L = E_R = 14400$ N/C

$\tan\theta = 0.5$

$\theta = 26.5^\circ$

$$E = 2 \times 14400 \times \sin\theta$$

$$= 1.29 \times 10^4 \hat{j} \ N/C$$

$$F = q\vec{E}$$

$$= -3 \times 10^{-6} \times 1.29 \times 10^4 \ N$$

$$= -3.86 \times 10^{-2} \hat{j} \ N$$