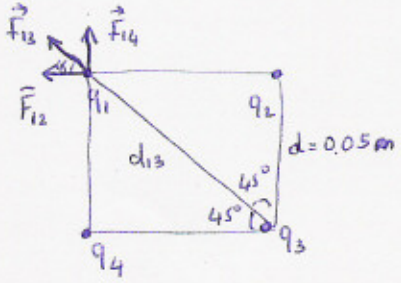
Phy 1304 Quiz 1 9-04-08 Name:

1) Four charges are at the corners of a square which has 5cm long sides. All of the charges are positive, q=+1x10^(-6) C. What is the magnitude of the force acting on each charge. [15 pts]



$q_1 = q_2 = q_3 = 1 \cdot 10^{-6}\ C$

$F = \dfrac{k q_1 q_2}{d^2}$

$\vec{F}_{1tot} = \vec{F}_{12} + \vec{F}_{13} + \vec{F}_{14}$

$F_{12} = \dfrac{k q_1 q_2}{d^2} = \dfrac{(9.10^9) \cdot (1.10^{-6})(1.10^{-6})}{(0.05)^2} = 3,6\ N$

$F_{14} = F_{12} = 3,6\ N$

$F_{13} = \dfrac{k q_1 q_3}{d_{13}^2} = \dfrac{(9.10^9) \cdot (1.10^{-6})(1.10^{-6})}{(0,05^2 + 0,05^2)} = 1,8\ N$

$F_{1x} = F_{12} + F_{13}\cos 45 = 3,6 + 1,8\cos 45 = 4,87\ N$

$F_{1y} = F_{14} + F_{13}\sin 45 = 3,6 + 1,8\sin 45 = 4,87\ N$

$F_{1tot} = \sqrt{F_{1x}^2 + F_{1y}^2} = \sqrt{4,87^2 + 4,87^2} = \boxed{6,9\ N = F_{1tot}}$