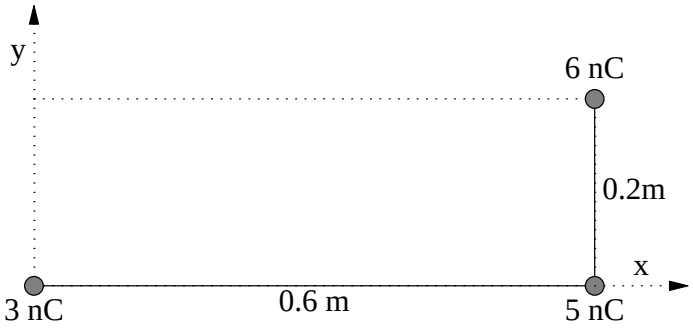
1. (30 pts.) Positive charges are situated at three corners of a rectangle, as shown in the Figure below. Find the magnitude and direction of the electric field vector at the fourth corner.



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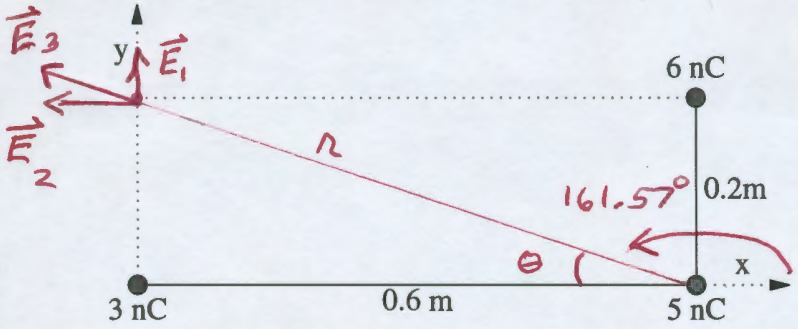

$\tan\theta = \frac{0.2}{0.6}$

$\theta = 18.43°$

$r = \sqrt{(0.2)^2 + (0.6)^2}$

$r = 0.632$

$\vec{E}_1 = \frac{k(3nC)}{(0.2)^2} = \frac{(8.99\times10^9)(3\times10^{-9})}{(0.2)^2} = 674.25 @ 90°$

$\vec{E}_2 = \frac{k(6nC)}{(0.6)^2} = \frac{(8.99\times10^9)(6\times10^{-9})}{(0.6)^2} = 149.83 @ 180°$

$\vec{E}_3 = \frac{k(5nC)}{(0.632)^2} = \frac{(8.99\times10^9)(5\times10^{-9})}{(0.4)} = 112.375 @ 161.57°$

Add as vectors:

$E_x = E_{1x} + E_{2x} + E_{3x} = 0 + 149.83\cos180° + 112.375\cos 161.57°$

$E_x = -256\ N/c$

$E_y = E_{1y} + E_{2y} + E_{3y} = 674.25\sin 90° + 0 + 112.375\sin 161.57°$

$E_y = 709.8\ N/c$

$E = 755\ N/c$ @ ~~109°~~ 110°