

300.0 test takers

counter clockwise



2

FIRST MIDTERM

Name (print) McL's solution Name (signed) _____

Discussion Instructor (circle): Brown Chakhbazian Condella Portnoi Zhukov

Discussion Section # _____

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SHOW ALL WORK!!!!

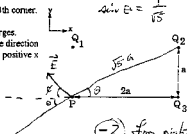
REPORT ALL NUMBERS TO THREE SIGNIFICANT FIGURES!

Use the conversion constants and data given on the front page.

Three charges are placed at corners of a rectangle as shown. Point P is at the 4th corner.

- (a) Calculate the electric field in \hat{i} , \hat{j} notation at point P due to these charges.
 (b) Find the force, magnitude and direction on an electron placed at P. The direction should be expressed as an angle measured counterclockwise from the positive x axis.

$Q_1 = -3.00 \times 10^{-6} \text{ C}$
 $Q_2 = +25.00 \times 10^{-6} \text{ C}$
 $Q_3 = -15.00 \times 10^{-6} \text{ C}$
 $a = 8.00 \text{ cm}$



$\cos \theta = \frac{2}{\sqrt{5}}$
 $\sin \theta = \frac{1}{\sqrt{5}}$

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a) $\vec{E} = -\frac{kQ_3}{4a^2} (\hat{i}) + \frac{-kQ_1}{a^2} (\hat{j}) - \frac{kQ_2}{5a^2} \left(\frac{2}{\sqrt{5}} \hat{i} + \frac{1}{\sqrt{5}} \hat{j} \right)$

$= \left[(-1.60 \times 10^6) \hat{i} + (+1.08 \times 10^6) \hat{j} \right] \frac{\text{N}}{\text{C}}$

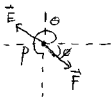
(-2) for right equation but wrong #'s.

(-1) if no units!

b) ~~calculate~~

(5) $\vec{F} = q \vec{E} = (-1.6 \times 10^{-19} \text{ C}) \vec{E} = \left[+1.63 \times 10^{-13} \hat{i} - 1.73 \times 10^{-13} \hat{j} \right] \text{ N}$

$\tan \phi = \frac{F_y}{F_x} \Rightarrow \phi = 46.7^\circ$



(2) $|F| = \sqrt{(F_x)^2 + (F_y)^2} = 2.38 \times 10^{-13} \text{ N}$

(1) $\theta = 313.3^\circ$

* Hard to read papers end up with a subjective score!!