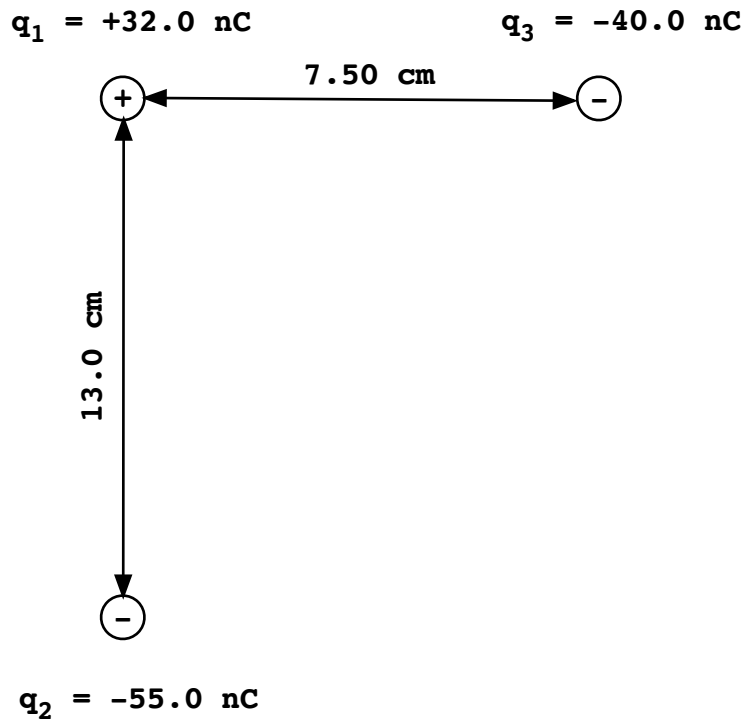


## **Physics 10164 - Exam 1D**

Partial credit will be given provided you show all work and are solving parts of the problem correctly. Points will be deducted if you don't show your work even if you get the right answer. Clearly indicate your answer with a circle or a box and remember to include correct units and significant figures.

1. (30 pts) Three charges are arranged in as shown below and fixed in place. Determine the magnitude and direction of the electric force on charge  $q_3$ .



2. (35 pts) An electron is released from rest at the negative plate of a capacitor and accelerates toward the positive plate. The plates are separated by a distance of 6.5 mm, and the electron strikes the positive plate with a speed of  $4.5 \times 10^6$  m/s.

- a) What is the magnitude of the (uniform) electric field between the plates?
- b) If the plate separation is doubled while the potential difference between the plates remains the same, would your answer to part (a) change? Explain your answer.
- c) As in (b), the plate separation is doubled while the potential difference between the plates remains the same. Does the amount of positive charge on the positive plate of the capacitor change? Explain your answer.

#3. (35 pts) For the circuit shown below, assume the voltage difference between points A and B is 480 Volts. Answer with 2 significant figures.

- a) Find the current through resistor  $R_3$ .
- b) Find the total power dissipated by resistor  $R_4$ .
- c) If energy costs 12 cents per kilowatt-hour, how much does it cost to dissipate the energy from  $R_4$  for one day, to the nearest cent?

