

## Practice Problem Set 1

Practice only – not to be turned in for grades!

### Question 1 (1 point)

List three basic properties of electric charge.

### Question 2 (3 points)

Four charged objects are sitting on a horizontal surface, each at the corners of a square. The first object is located at the origin with a charge of  $+0.25 \text{ mC}$ . The second object is located at  $(x, y) = (0, 0.5 \text{ m})$  with a charge of  $-0.25 \text{ mC}$ . The third object is located at  $(x, y) = (0.5 \text{ m}, 0)$  with a charge of  $-0.25 \text{ mC}$ . The fourth object is located at  $(x, y) = (0.5 \text{ m}, 0.5 \text{ m})$  and a charge of  $+0.25 \text{ mC}$ . What are the forces on each of the objects? What is the strength of the electric field at the center of the square?

### Question 3 (3 points)

Two charged objects are sitting on a horizontal surface. The first object is located at the origin with a charge of  $+0.25 \text{ mC}$ . The second object is located at  $(x, y) = (0, 0.5 \text{ m})$  with a charge of  $-0.25 \text{ mC}$ . What is the energy required to move both charges from an infinite distance away to the positions they are in now? If the electric potential an infinite distance away is set to be  $0\text{V}$ , what is the electric potential at the point halfway between the two charges?

### Question 4 (3 points)

- a) An infinitely long rod sits horizontally along the  $x$ -axis with a continuous uniform charge distribution such that the linear charge density  $\lambda$  is  $0.015 \text{ C/m}$ . At a point  $0.35 \text{ m}$  directly below the rod what is the strength of the electric field? Solve WITHOUT Gauss' Law.
- b) Same as part (a), but now DO use Gauss' Law to solve. Which method is easier?