

**Physics 112**  
**Quiz #5**  
**September 10, 1999**

Name: \_\_\_\_\_

$$e = 1.60 \times 10^{-19} \text{ C}$$
$$k = 9 \times 10^9 \text{ N m}^2/\text{C}^2$$

1. An electric field that is **not** uniform is present in a room. When a 1C charge is brought into the room and placed in the center of the room, it feels a force of 10N toward the north. The 1C charge is then removed. If a  $-2\text{C}$  charge is now brought into the room 3m away from the center of the room, what is the magnitude and direction of the force on the  $-2\text{C}$  charge?
  - A. 0N
  - B. 10N toward the north
  - C. 20N toward the north
  - D.  $1 \times 10^9\text{N}$  toward the north
  - E.  $2 \times 10^9\text{N}$  toward the north
  - F. 10N toward the south
  - G. 20N toward the south
  - H.  $1 \times 10^9\text{N}$  toward the south
  - I.  $2 \times 10^9\text{N}$  toward the south
  - J. There is not enough information to answer the problem.
  
2. An electron is located at the point  $(x = -1\text{m}, y = 0\text{m})$  and a proton is located at the point  $(x = 1\text{m}, y = 0\text{m})$ . The direction of the **net** electric field at the point  $(x = 0\text{m}, y = 1\text{m})$  is:
  - A. towards positive x
  - B. towards positive y
  - C. towards negative x
  - D. towards negative y
  - E. towards a different direction than those given in A, B, C, and D
  - F. There is no electric field at that point.
  - G. There is not enough information to answer the problem.
  
3. A proton is fixed at the origin; there are no other “source” charges present. Which of these is **true** about the electric field at a point “P” 2 m from the origin?
  - A. If there is no particle located at point P — if it is just vacuum, i.e., “empty space” — then there is no electric field there.
  - B. A test charge  $q$  and a test charge  $2q$  placed at point P will detect **different** magnitudes of the electric field at that point.
  - C. A test charge  $q$  and a test charge  $2q$  placed at point P will experience **different** magnitudes of electrical force at that point.
  - D. The electric field at point P is a measure of how much area is in the neighborhood of the proton.
  - E. The electric field at point P will have the same magnitude as the electric field at a point 1 m from the origin.
  
4. Two protons are located at  $(-1 \text{ m}, 0 \text{ m})$  and three electrons are located at  $(+1 \text{ m}, 0 \text{ m})$ . What is the magnitude and direction of the **net electric field** at the origin? *No partial credit. Your answer must be within 10% of the correct answer to receive credit. Units missing or incorrect: -1 point.*

**Answer: magnitude [2 pts] \_\_\_\_\_; direction [0.5 pt]: \_\_\_\_\_**