Print Names in Team: _____.

Physics 232	Mission 1: Electric Fields & Coulomb's Law

Please work each problem in the white space provided. Box your answer and explain your steps. Attach additional sheets if necessary. Print this one-sided and staple in the top left corner with a metal staple once complete. Each team turns in one document.

Problem 1 Suppose a charge $Q = 3.0\ nC$ is placed at $(2, 3)m$. What is the magnitude and direction of the electric field due to Q at $(-2, 1)m$? Give the direction of the electric field in terms of the standard angle.

Problem 2 Suppose charges of $Q, 2Q, -Q$ and $2Q$ are placed at $(-L, -L), (-L, L), (L, L)$ and $(L, -L)$ respectively. Find the electric field at the origin.

Problem 3 Suppose a charge $Q_1 = 3.0\ nC$ is placed at $(1, 2, 3)m$ and a second charge $Q_2 = -4.0\ nC$ is placed at $(-1, 0, 4)m$. What is the electric field at an arbitrary point (x, y, z) ?

Problem 4 A positive charge Q is evenly distributed from $(0, -L/2)$ to $(0, L/2)$. Find the electric field due to this charge distribution at $(x, 0)$ for $x > 0$.

Problem 5 Suppose $Q_1 = Q$ is stuck at $y = 0$ and $Q_2 = -Q$ is stuck at $y = L$. Assume these charges are near the surface of the Earth and $F_g = -mg\hat{y}$. If a charge $Q_3 = 2Q$ is in equilibrium at $y = L/2$ between Q_1 and Q_2 then what is the mass m of the middle charge ? Include a free body diagram for the middle charge including all the gravitational and electric forces which act on m. (all three charges are placed where $x = 0$)

Problem 6 Suppose a charge $Q_1 = 4.0\ nC$ has a charge $Q_2 = -60.0\ nC$ are placed distance $30.0\ cm$ apart. Find x such that the electric field at P is zero.