

Your name:

G#:

George Mason University

Department of Electrical and Computer Engineering

ECE 305 --- Electromagnetic Theory

Fall 2017

Mid-term Exam 1

Date: Monday 10/05/2017

**Policy: Provide details of the solution for each problem. A solution with only final results will not get credit.**

Problem 1 (40 pts) If there is a line  $L$  ( $y = 1, z = 1$ ) carries charge with density  $= 20 \text{ nC/m}$ ; there is a plane at  $x = 4$  carrying  $10 \text{ nC/m}^2$  and there is a point charge of  $5 \text{ nC}$  located at  $(-3, 4, 0)$ . Please (i) calculate  $\mathbf{E}$  at  $(2, 2, -2)$ ; (ii) if  $V=0$  at  $O(0, 0, 0)$ , find  $V$  at  $P(1, 0, 2)$

**Solution:**

Your name:

G#:

Problem 2 (50 pts): If spherical surfaces  $r = 1$  m and  $r = 2$  m, respectively, carry uniform surface charge densities  $8 \text{ nC/m}^2$  and  $-6 \text{ mC/m}^2$ , (two spheres center at origin  $(0, 0, 0)$ ), Determine  $D$  at  $r = 4$  m.

**Solution:**

Problem 3 (10 points) (i) What is Gauss's law?

**An:**

(ii) Please write the first of the four Maxwell's equations and define the symbol.