3/26/2013 **EE324 – Electromagnetic Theory** **Test II**

(Closed Book Exam)

60 Minutes

Problem # 1 (25 Points) HW5, Problem 3.19

Transform the vector $\vec{E} = -\hat{r} + \hat{\phi}$ from cylindrical into spherical coordinates and then evaluate it at the point $P = (3, \frac{\pi}{2}, \pi)$.

Problem # 2 (25 Points) HW 6, Problem 3.40

For the scalar function $V = xy$, determine its directional derivative along the direction of vector $\vec{A} = \hat{x} + \hat{y}$ and the evaluate it at P=(1,-1,2).

Problem # 3 (25 Points) HW 7, Problem 4.27

An infinitely long cylindrical shell extending between r=1 m and r=3 m contains a uniform charge density ρ_0. Apply Gauss's law to find $\vec{D}$ in all regions

Problem # 4 (25 Points) Exercise 5.12

With reference to figure below, determine the angle between $\vec{H}_1$ and $\hat{n}_2 = \hat{z}$ if $\vec{H}_2 = (\hat{x}3 + \hat{z}2)(A/m)$, $\mu_{r_1} = 2$, and $\mu_{r_2} = 8$, and $\vec{J}_s = 0$