Math 105 - Multivariable Calculus (Miller) - Midterm #2 - April 20, 2011

Please fill the info below *neatly*! This question is due at the start of class on Wednesday.

NAME: ____

Your class hour:(Circle one)9:0010:00BE NEAT PLEASE.QUESTIONS? CALL ME AT 617-835-3982.INITIAL THE HONOR CODE STATEMENT:

I have neither given nor received aid on this examination.

- 1. (20 points) Let $\overrightarrow{P} = (1, 0, -1), \ \overrightarrow{Q} = (1, 1, 1) \ \text{and} \ \overrightarrow{R} = (1, -2, 1).$
 - 1. Find the cosine of the angle between \overrightarrow{P} and \overrightarrow{Q} , and find the equation of the plane containing \overrightarrow{P} , \overrightarrow{Q} and \overrightarrow{R} .
 - 2. Compute the following quantities if possible; if not possible, state why not:
 - 3. Let $f(x, y, z) = \sin(xyz)$. Find the directional derivative of f(x, y, z) at the point \overrightarrow{P} in the direction \overrightarrow{Q} .
 - 4. Let $f(u,v) = u^2 + v^2$, $g(x,y,z) = (\sin(xy) + z, e^x + yz)$ and set h(x,y,z) = f(g(x,y,z)). Using the Chain Rule, compute $\frac{\partial h}{\partial x}$ at the point (0,0,0).
 - 5. Let f(x, y) = 3x + y and $g(x, y) = x^2 + y^2$. Find the maximum and minimum values of f(x, y) given that g(x, y) = 1.