King Fahd University of Petroleum and Minerals
Department of Mathematical Sciences
Math 201-19 Class Test 3 Fall 2010(010)

ID#:_____ NAME:_____

Serial#_____ **(SHOW YOUR WORK)**

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(1) Find an equation for the plane that passes through $P_0(1, -1, 2)$ and is normal to the intersection of the planes $2x + y + 3z - 1 = 0$ and $x - y + 2z + 3 = 0$. (10pts)

(2) Find the distance between the lines $l_1 : \frac{x-1}{2} = \frac{y+1}{3} = \frac{z-2}{1}$ and $l_2 : \frac{x+2}{1} = \frac{y-1}{2} = \frac{z+1}{-1}$.
. (10pts)

(3) Let $f(x,y) = \begin{cases} \frac{x^3+y^4}{x^2+y^2} & (x,y) \neq (0,0) \\ 0 & (x,y) = (0,0). \end{cases}$

(a) Does $\lim_{(x,y)\to(0,0)} f(x,y)$ exist? (10pts)

(b) Find $\frac{\partial f}{\partial x}$ and $\frac{\partial f}{\partial y}$ at $(0,0)$ if they exist? (10pts)

(4) Let $f(u)$ be a differentiable function and let $z = f(\sqrt{x^2 + y^2})$.
Show that $x\frac{\partial z}{\partial y} - y\frac{\partial z}{\partial x} = 0$. (10pts)

(5) Find the level surface of $f(x, y, z) = \frac{3}{2}y^2 - \frac{x^2}{2} - z$ passes through the point $P_0(-1, 1, 1)$,and sketch the surface. (10pts)

(6) The length and width of a rectangle are measured as 30cm and 24cm, respectively, with an error in measurement of at most 0.1cm in each. Use differentials to estimate the maximum error in the calculated area of the rectangle. (10pts)