MATH 213- EXAM II -OCTOBER 20, 2004

1) Evaluate the limits if they exist (show all work)

a) $\lim\limits_{(x,y)\to(0,0)} \frac{xy}{\sqrt{4x^2+4y^2}}$

b) $\lim\limits_{(x,y)\to(0,0)} \frac{xy}{4x^2+4y^2}$

c) $\lim\limits_{(x,y)\to(0,0)} \frac{y}{x^2+y}$

2)Determine the local extrema locations (critical points) for

a) $z = xy^2 + \frac{x^2}{2} + y^2 + 10$

b) $z = 2(x+1)^2 + 3(y-2)^2 + 6(y-2)$

c)classify the point (max,min,saddle point) found in part b)

3)Determine, using the chain rule, for $w = xe^z + zy$

a) $\frac{dw}{dt}$ at t=1, where $x=\frac{1}{t}$, $y=t^3$ and $z=t-1$

b) $\frac{\partial w}{\partial v}$ at u=1 and v=1, where $x=u^2+v$, $y=uv^2$, $z=v^2-u^2$

4)For the surface given by the equation $x^2yz + x + yz^3 = 7$

Determine and evaluate, at the point (2,1,1)

a)The equation of the plane tangent to the surface

b) $\frac{\partial z}{\partial x}$ where z=f(x,y) is implicitly described the given equation

5) For the function $f(x,y,z) = \frac{x}{y} + 2yxz$, evaluate at the point (1,1,0)

a) The directional derivative in the direction $\mathbf{V} = \mathbf{i} - 2\mathbf{j} - 2\mathbf{k}$

b) A unit vector in the direction in which the directional derivative is a maximum

c)The maximum value of the directional derivative

6)Using Lagrange multipliers, find the point on the plane x+2y+3z=6, closest to the origin (0,0,0) (Hint:Minimize the square of the distance between the origin and a point (x,y,z) on the plane)