MATH 213- EXAM II -OCTOBER 29, 2008

1)

a)Find all local minima, maxima, and saddle points (if they exist)
for $z = 6x^2 - 2x^3 + 3y^2 + 6xy$

.

b)Using the chain rule
Evaluate $\frac{\partial w}{\partial u}$ at $u = 2, v = 1$ for $w = xyz + y^2 + z^2$ where $x = u + v$, $y = uv$, $z = \frac{u}{v}$

2)Consider the surface described implicitly by the equation $2yx^3 + \frac{z^2}{x} + xz\ln y = 3$

a)Find the equation of the tangent plane to the surface at the point (1,1,1)

.

b) Using the linear approximation evaluate the approximate value of z on the surface when x=1.01 and y=.98

3)For the function $f(x,y) = (2x - 3y + 4z)^3$ at the point P(-5,1,3)
a) Determine the directional derivative in the direction $\mathbf{V} = \mathbf{i} - \mathbf{k}$

.

b) Determine a unit vector in the direction where the function changes most rapidly

4)Using Lagrange mulipliers find the highest and lowest temperature on the surface

of the sphere, $x^2 + y^2 + z^2 = 1$ where the temperature distribution within the sphere is described by $T = 400xyz^2$

.

5)a)Evaluate the integral, by reversing the order of integration

$$\int_0^8 \int_{y^{\frac{1}{3}}}^2 e^{x^4}\,dx\,dy$$

b)Determine if the limit exists(show all work)

$$\lim_{(x,y)\to(0,0)} \frac{x^3+2y^3}{x^2y+xy^2}$$