Math 3435 **Homework Set 4** **10 Points**

Tangent Planes and Normal Lines

1. Find the equations of the tangent plane and normal line to the surface given by $y^2\mathbf{e}^{-6x} - 4z(x+2)^2 = 14$ at the point $(0,2,-3)$.

2. Find the point(s) on the surface $4x^2 - y^2 + 3z^2 = 8$ where the tangent plane is parallel to the plane $3x + 2y - 4z = 2$.

Relative Extrema

For problems 3 & 4 find and classify all the critical points of the given function.

3. $h(x,y) = \frac{5}{4}y^4 - 4x^2y - 10y^2 + 12x^2$

4. $g(x,y) = xy\mathbf{e}^{-\frac{1}{4}\left(8x^2+2y^2\right)}$ Tip : Make sure you simplify the derivatives at each step.

Absolute Extrema

5. Find the absolute extrema of $f(x,y) = x(y-1) + \frac{1}{x} + \frac{1}{y-1}$ on the triangle with vertices (8,0), (16,0) and (16,-1).

Lagrange Multipliers

For problems 6 – 8 use Lagrange Multipliers to find the maximum and minimum values of the function subject to the given constraint.

6. $f(x,y) = 2xy^2$; $x^2 + y^2 = 6$

7. $f(x,y,z) = xyz$; $2x^2 + y^2 - 4z = 32$

For this problem assume $z \le 0$. Why is this assumption important? And yes I do expect you to answer this….

8. $f(x,y,z) = 6x - 2y - z^2$; $x^2 + y^2 + z^2 = 90$