**Tangent Planes and Normal Lines**

1. Find the equations of the tangent plane and normal line to the surface given by
   \[ x^3 \cos(4y) + 4y(3 - z)^2 = 8 \] at the point \((-1, 0, 5)\).

2. Find the point(s) on the surface \(3x^2 - y^2 + 6z^2 = 1\) where the tangent plane is parallel to the plane \(9x - 3y + z = -2\).

**Relative Extrema**

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

3. \(h(x, y) = 2x^4 + 4xy^2 - 2y^2 - 4x^2\)

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

**Absolute Extrema**

5. Find the absolute extrema of \(f(x, y) = x(12 - y) - \frac{1}{x} - \frac{1}{8(y - 12)}\) on the triangle with vertices \((1, 0), (4, 0)\) and \((1, 9)\).

**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. \(f(x, y) = 8x^2y \quad 2x^2 + y^2 = 9\)

7. \(f(x, y, z) = xyz \quad 9x^2 + y^2 - 3z = 16\)
   For this problem assume \(z \leq 0\). Why is this assumption important? And yes I do expect you to answer this.

8. \(f(x, y, z) = 8z - x^2 - 2y^2 \quad x^2 + y^2 + z^2 = 7\)