**Tangent Planes and Normal Lines**

1. Find equations of the normal line and the tangent plane to the surface given by $6\sqrt{y+2z} + 4x = x^2 z + 6$ at the point $(2, -1, 5)$.

2. Find the point(s) on the surface $3x^2 + y^2 - 6z^2 = 2$ where the tangent plane is parallel to the plane $-x + 8y + 4z = -3$.

**Relative Extrema**

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

3. $g(x, y) = 2x \sqrt{y + x^2} - \frac{1}{6} y - 10x^2 + 3x$

4. $f(x, y) = 2x^3 + y^2 x^2 + 2x^2 - 4y^2 - 7x$

**Absolute Extrema**

5. Find the absolute maximum and minimum of the following function on the set $D$.

$$h(x, y) = (10x + 2x^3)(y^2 - 4y)$$

$D$ is the closed triangular region with vertices $(0,0)$, $(-4,0)$, and $(-4,8)$.

**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. $f(x, y) = 8x^2 + y^2$ ; $x^4 + y^4 = 4$

7. $f(x, y, z) = 2z - 8x^2$ ; $4x^2 + y^2 + z^2 = 1$

8. $f(x, y, z) = xyz$ ; $x^2 + 4y^2 + 3z^2 = 36$