Week 4

14.5 The Chain Rule

1. Use the Chain Rule to find dz/dt.

$$z = xy^3 - x^2y, \quad x = t^2 + 1, \quad y = t^2 - 1$$

2. Use the Chain Rule to find $\partial z/\partial s$ and $\partial z/\partial t$.

$$z = (x - y)^5, \quad x = s^2t, \quad y = st^2$$

3. Find dy/dx.

$$y \cos x = x^2 + y^2$$

4. Find $\partial z/\partial x$ and $\partial z/\partial y$.

$$x^2 + 2y^2 + 3z^2 = 1$$

14.6 Directional Derivatives

5. Find the derictional derivative of f at the given point in the direction indicated by the angle θ.

$$f(x, y) = y \cos(xy), \quad (0, 1), \quad \theta = \pi/4$$

6. Find the derictional derivative of f at the given point in the direction of the vector $\mathbf{v}$.

$$f(x, y) = e^x \sin y, \quad (0, \pi/3), \quad \mathbf{v} = \langle -6, 8 \rangle$$

14.7 Maximum and Minimum Values

7. Find the local maximum and minimum values and saddle point(s) of the function.

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