Assignment 10

1. Find $\dfrac{\partial w}{\partial s}$ and $\dfrac{\partial w}{\partial t}$ using the appropriate Chain Rule.

$$w = x^2 + y^2 + z^2,\ x = t\sin s,\ y = t\cos s,\ z = st^2$$

2. Differentiate implicitly to find the first partial derivatives of a.

   (a) $x\ln y + y^2 a + a^2 = 8$ (b) $a - \sqrt{x-y} - \sqrt{y-z} = 0$

3. Find the directional derivative of the function at P in the direction of $\mathbf{v}$.

$$f(x,y) = e^{-(x^2+y^2)},\ P(0,0),\ \mathbf{v} = \mathbf{i} + \mathbf{j}$$

4. Use the gradient to find the directional derivative of the function at P in the direction of $\overrightarrow{PQ}$.

$$f(x,y,z) = \ln(x+y+z),\ P(1,0,0),\ Q(4,3,1)$$

5. Find the gradient of the function and the maximum value of the directional derivative at the given point.

$$f(x,y) = \frac{x+y}{y+1},\ (0,1)$$