

## Homework8

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

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

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

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

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

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

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

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