

## 0.1 Gradient

In a scalar field we can calculate the partial derivative at any point with respect to one input.

We may wish to consider these collectively. To do that we use the gradient operator.

We previously introduced the Del operator where:

$$\nabla = (\sum_{i=1}^n e_i \frac{\delta}{\delta x_i})$$

Where  $e$  are the basis vectors.

This on its own means nothing. It is similar to the partial differentiation function.

We now multiply Del by the function. This gives us:

$$\nabla f = (\sum_{i=1}^n e_i \frac{\delta f}{\delta x_i}).$$
 This gives us a vector in the underlying vector space.

This is the gradient.