1 Mul Operator

The Multiplication Operator is defined as $f(u, v) = uv$. To find the gradient w.r.t u and v, we will use the product rule of derivatives, which is defined as:

$$\frac{\delta}{\delta x}(uv) = v\frac{\delta u}{\delta x} + u\frac{\delta v}{\delta x}$$

To find the gradient w.r.t u, we will set u as our x and treat v as a constant, which gives us the following:

$$\frac{\delta}{\delta u}(uv) = v\frac{\delta u}{\delta u} + u\frac{\delta v}{\delta u} = v + u\frac{0}{\delta u} = v$$

To find the gradient w.r.t v, simply do the same, this time setting v as x and treat u as constant.

$$\frac{\delta}{\delta v}(uv) = v\frac{\delta u}{\delta v} + u\frac{\delta u}{\delta u} = v\frac{0}{\delta v} + u = u$$

Therefore, we can say that the gradient w.r.t u is v, and the gradient w.r.t v is u.