



Forward:

$$P = \omega_1 * x_1 = 0.2 * 0.4 = 0.08$$

$$q = \omega_2 * x_2 = 0.3 * 0.5 = 0.15$$

$$r = P + q + b = 0.08 + 0.15 + 0.1 = 0.33$$

$$s = r * 2 = 0.33 * 2 = 0.66$$

$$t = \exp(s) = e^{0.66} = 1.935$$

$$u = t^{-1} = 1.935^{-1} = 0.935 = f$$

Backward:

$$\frac{\partial f}{\partial u} = \frac{\partial f}{\partial t} = 1$$

$$\frac{\partial u}{\partial t} = \frac{\partial}{\partial t}(t^{-1}) = -1 \rightarrow \frac{\partial f}{\partial t} = 1$$

$$\frac{\partial t}{\partial s} = \frac{\partial}{\partial s}(e^s) = e^s \rightarrow \frac{\partial f}{\partial s} = 1 * e^s = 1.935$$

$$\frac{\partial s}{\partial r} = \frac{\partial}{\partial r}(2r) = 2 \rightarrow \frac{\partial f}{\partial r} = 2 * \frac{\partial f}{\partial s} = 3.870$$

$$\frac{\partial r}{\partial p} = \frac{\partial r}{\partial q} = \frac{\partial q}{\partial b} = 1 \rightarrow \frac{\partial f}{\partial p} = \frac{\partial f}{\partial q} = \frac{\partial f}{\partial b} = 1 * \frac{\partial f}{\partial r} = 3.870$$

$$\frac{\partial p}{\partial \omega_1} = x_1 \rightarrow \frac{\partial f}{\partial \omega_1} = x_1 * \frac{\partial f}{\partial p} = 1.548$$

$$\frac{\partial q}{\partial \omega_2} = x_2 \rightarrow \frac{\partial f}{\partial \omega_2} = x_2 * \frac{\partial f}{\partial q} = 1.935$$