(7,12)*

$$f_1 = \exp(x)$$
$$f_2 = f_1^2$$
$$f_3 = f_1 + f_2$$
$$f_4 = \exp(f_3)$$
$$f_5 = \sin(f_3)$$
$$y = f_4 + f_5$$

$$\frac{\partial y}{\partial f_5} = 1, \quad \frac{\partial y}{\partial f_4} = 1, \quad \frac{\partial y}{\partial f_3} = ?$$

$$\frac{\partial f_5}{\partial f_3} = \cos f_3 \qquad \frac{\partial f_4}{\partial f_3} = \exp(f_3)$$

$$\frac{\partial f_3}{\partial f_1} = 1, \quad \frac{\partial f_3}{\partial f_2} = 1, \quad \frac{\partial f_2}{\partial f_1} = 2f_1$$

$$\frac{\partial f_1}{\partial x} = \exp(x)$$

$$\frac{\partial y}{\partial f_3} = \frac{\partial y}{\partial f_4} \cdot \frac{\partial f_4}{\partial f_3} = 1 \cdot \exp(f_3) = \exp(f_3).$$

$$\frac{\partial y}{\partial f_2} = \frac{\partial y}{\partial f_3} \cdot \frac{\partial f_3}{\partial f_2} = \exp(f_3) \cdot 1 = \exp(f_3).$$

$$\frac{\partial y}{\partial f_1} = \frac{\partial y}{\partial f_2} \cdot \frac{\partial f_2}{\partial f_1} = \exp(f_3) \cdot 2f_1$$

$$\frac{\partial y}{\partial x} = \frac{\partial y}{\partial f_1} \cdot \frac{\partial f_1}{\partial x} = \exp(f_3) \cdot 2f_1 \cdot \exp(x).$$