7.12*

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

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

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

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

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

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

Mistake here - missed off the other leg of the graph.

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

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

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