1.
- $z = x^2y^3$
- $x = s\cos(t)$
- $y = s\sin(t)$

a) $\frac{\partial z}{\partial s} = \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial s} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial s} =$
$f_x(x(s), y(s)) \cdot \cos(t) + f_y(x(s), y(s)) \cdot \sin(t) =$
$2xy^3\big|_{(x(s),y(s))} \cdot \cos(t) + 3x^2y^2\big|_{(x(s),y(s))} \cdot \sin(t) =$
$2s\cos(t)(s\sin(t))^3 \cdot \cos(t) + 3(s\cos(t))^2(s\sin(t))^2 + \sin(t)$

b) $\frac{\partial z}{\partial t}\ \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t} =$
$f_x(x(t), y(t)) \cdot (-s\sin(t)) + f_y(x(t), y(t)) \cdot s\cos(t) =$
$2s\cos(t)(s\sin(t))^3 \cdot (-s\sin(t)) + 3(s\cos(t))^2(s\sin(t))^2 \cdot s\cos(t) =$

2.
- $z = \sin(x)\cos(y)$
- $x = st^2$
- $y = s^2t$

a) $\frac{\partial z}{\partial s}\ \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t} =$
$\cos\big(st^2\big)\cos\big(s^2t\big) \cdot t^2 + \cos\big(st^2\big)\big(-\sin\big(s^2t\big)\big) \cdot 2st$

b) $\frac{\partial z}{\partial t}\ \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t} =$
$\cos\big(st^2\big)\cos\big(s^2t\big) \cdot 2st + \cos\big(st^2\big)\big(-\sin\big(s^2t\big)\big) \cdot s^2$

3.
- $z = e^{x+2y}$
- $x = \frac{s}{t}$
- $y = \frac{t}{s}$

a) $\frac{\partial z}{\partial s}\ \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t} =$
$e^{\frac{s}{t}+\frac{2t}{s}} \cdot \frac{1}{t}\ 2e^{\frac{s}{t}+\frac{2t}{s}} \cdot \frac{-t}{s^2}$

b) $\frac{\partial z}{\partial t}\ \frac{\partial f}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial f}{\partial y} \cdot \frac{\partial y}{\partial t} =$
$e^{\frac{s}{t}+\frac{2t}{s}} \cdot \frac{-s}{t^2}\ 2e^{\frac{s}{t}+\frac{2t}{s}} \cdot \frac{1}{s}$