1) a) $f(x,y) = x^4 y^3 + 8x^2 y$

$$\frac{\partial f}{\partial x} = 4y^3 x^3 + 16 y x \qquad\qquad \frac{\partial f}{\partial y} = 3x^4 y^2 + 8x^2$$

b) $f(x,t) = \sqrt{x}\, \ln t = x^{\frac{1}{2}} \ln t$

$$\frac{\partial f}{\partial x} = \frac{\ln t}{2\sqrt{x}} \qquad\qquad \frac{\partial f}{\partial t} = \frac{\sqrt{x}}{t}$$

c) $f(x,y) = \frac{x}{(x+y)^2} = x(x+y)^{-2}$

$$\frac{\partial f}{\partial x} = 1 \cdot \frac{1}{(x+y)^2} + x\left(-2(x+y)^{-3} \cdot 1 + 0\right) = \frac{1}{(x+y)^2} - \frac{2x}{(x+y)^3} = \frac{-x+y}{(x+y)^3}$$

c) $\frac{\partial f}{\partial y} = x \cdot \frac{\partial}{\partial y}(x+y)^{-2} =$

$= x\left(-2(x+y)^{-3} \cdot (0+1)\right) = \frac{-2x}{(x+y)^3}$