b) ① $w = x^2 \cos(xy)$

$$\boxed{\frac{\partial^2 w}{\partial x \partial y}} = \frac{\partial}{\partial x}\left(\frac{\partial}{\partial y}\left(x^2 \cos(xy)\right)\right)$$

$$= \frac{\partial}{\partial x}\left(-x^2 x \operatorname{sen}(xy)\right)$$

$$= \frac{\partial}{\partial x}\left(-x^3 \operatorname{sen}(xy)\right)$$

$$= \boxed{-3x^2 \operatorname{sen}(xy) - x^3 y \cos(xy)}$$

② $$\boxed{\frac{\partial^2 w}{\partial y \partial x}} = \frac{\partial}{\partial y}\left(\frac{\partial}{\partial x}\left(x^2 \cos(xy)\right)\right)$$

$$= \frac{\partial}{\partial y}\left(2x\cos(xy) - x^2 y \operatorname{sen}(xy)\right)$$

$$= -2x(x \operatorname{sen}(xy)) - x^2 \operatorname{Sen}(xy) - x^2 y x \cos(xy)$$

$$-2x^2 \operatorname{sen}(xy) - x^2 \operatorname{sen}(xy) - x^3 y \cos(xy)$$

$$\boxed{-3x^2 \operatorname{sen}(xy) - x^3 y \cos(xy)}$$

① e ② são iguais logo

$$\boxed{\frac{\partial^2 w}{\partial x \partial y}} = \boxed{\frac{\partial^2 w}{\partial y \partial x}}$$

2)

$$w_{xyz} = \frac{\partial^3 w}{\partial z \partial y \partial x}, \quad w = x^3 y^2 z + x y^6 z - y z$$

$$= \left(\frac{\partial}{\partial z}\right)\left(\frac{\partial}{\partial y}\right)\left(\frac{\partial}{\partial x}\left(x^3 y^2 z + x y^6 z - y z\right)\right)$$