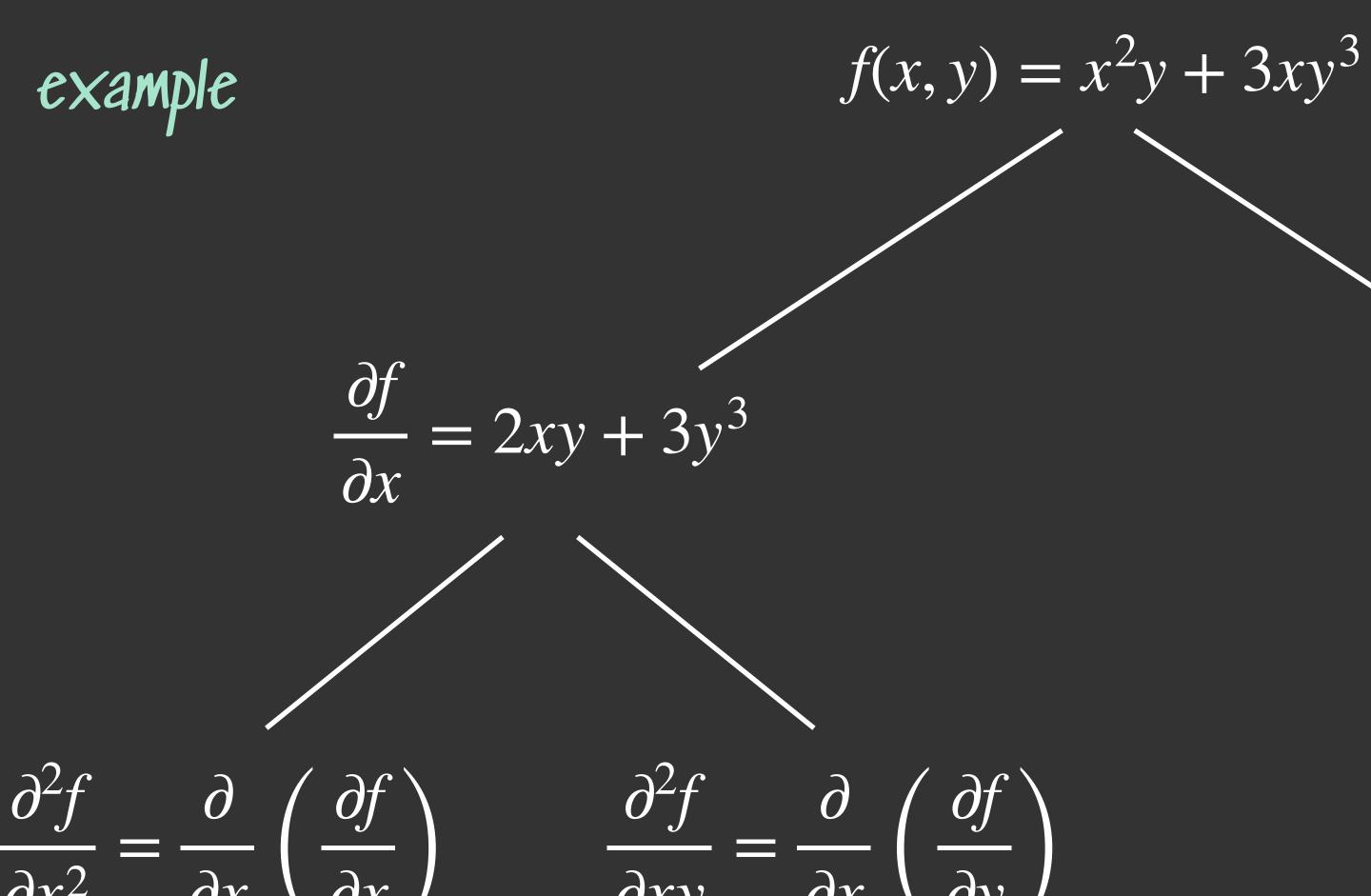
the symmetry of second partial derivatives

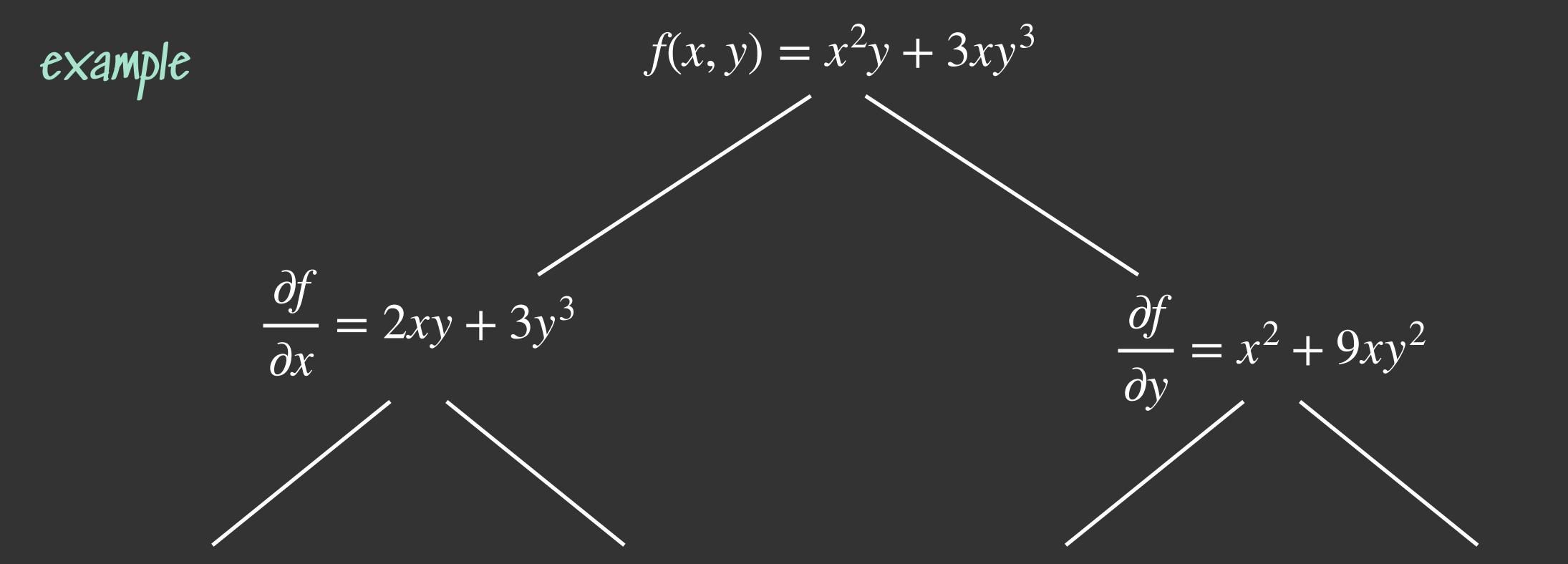
 $=2x+9y^2$



=2y

$$\frac{\partial f}{\partial y} = x^2 + 9xy^2$$

the symmetry of second partial derivatives



$$\frac{\partial^2 f}{\partial x^2} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial x} \right) \qquad \frac{\partial^2 f}{\partial xy} = \frac{\partial}{\partial x} \left(\frac{\partial f}{\partial y} \right)$$
$$= 2y \qquad = 2x + 9y^2$$

$$\frac{\partial^2 f}{\partial yx} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial x} \right) \qquad \frac{\partial^2 f}{\partial y^2} = \frac{\partial}{\partial y} \left(\frac{\partial f}{\partial y} \right)$$
$$= 2x + 9y^2 \qquad = 18xy$$