

$$5. \quad w = x^3 + y^2, \quad x = 4s + 2t, \quad y = 5s - 3t \quad \text{poinți: } s=2, t=1$$

$$\frac{\partial x}{\partial s} = 4$$

$$\frac{\partial y}{\partial s} = 5$$

$$\frac{\partial x}{\partial t} = 2$$

$$\frac{\partial y}{\partial t} = -3$$

$$\frac{\partial w}{\partial s} = \frac{\partial w}{\partial x} \cdot \frac{\partial x}{\partial s} + \frac{\partial w}{\partial y} \cdot \frac{\partial y}{\partial s}$$

$$\frac{\partial w}{\partial t} = \frac{\partial w}{\partial x} \cdot \frac{\partial x}{\partial t} + \frac{\partial w}{\partial y} \cdot \frac{\partial y}{\partial t}$$

$$= (3x^2)(4) + (2y)(5)$$

$$= (3x^2)(2) + (2y)(-3)$$

$$= 12x^2 + 10y$$

$$= 6x^2 - 6y$$

PLUG IN $x = 4s + 2t, y = 5s - 3t$

$$= 6[x^2 - y]$$

$$= 12(4s + 2t)^2 + 10(5s - 3t)$$

PLUG IN $x = 4s + 2t, y = 5s - 3t$

$$= 12(4s + 2t)(4s + 2t) + 50s - 30t$$

$$= 6[(4s + 2t)^2 - (5s - 3t)]$$

$$= 12(16s^2 + 8st + 8st + 4t^2) + 50s - 30t$$

$$= 6[16s^2 + 16st + 4t^2 - 5s + 3t]$$

$$= 12(16s^2 + 16st + 4t^2) + 50s - 30t$$

$$= 96s^2 + 96st + 24t^2 - 30s + 18t$$

$$= 192s^2 + 192st + 48t^2 + 50s - 30t$$

PLUG IN $s=2, t=1$

PLUG IN $s=2, t=1$

$$= 192(2)^2 + 192(2)(1) + 48(1)^2 + 50(2) - 30(1)$$

$$= 96(2)^2 + 96(2)(1) + 24(1)^2 - 30(2) + 18(1)$$

$$= 1270$$

$$= 558$$