

Problem: If $z = f(x - y)$, use the chain rule to show that $\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 0$.

$$\frac{\partial z}{\partial x} = \frac{\partial f(x - y)}{\partial x} = f'(x - y) \cdot \frac{\partial(x - y)}{\partial x} = f'(x - y)$$

$$\frac{\partial z}{\partial y} = \frac{\partial f(x - y)}{\partial y} = f'(x - y) \cdot \frac{\partial(x - y)}{\partial y} = -f'(x - y)$$

$$\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = f'(x - y) - f'(x - y) = 0$$