Chain rule

$$xz + y^2z^2 = 0$$

Find $\frac{\partial z}{\partial x}$ & $\frac{\partial z}{\partial y}$

$$y^2z^2 + xz = 0$$

$$z = \frac{-x \pm \sqrt{x^2 - 4y^2(0)}}{2y^2} = \frac{-x \pm |x|}{2y^2} = \begin{cases} \frac{-x \pm x}{2y^2}, & x \geq 0 \\ \frac{-x \mp x}{2y^2}, & x < 0 \end{cases}$$

$\frac{-x+x}{2y^2} = 0$

$\frac{-x-x}{2y^2} = \frac{-x}{y}$

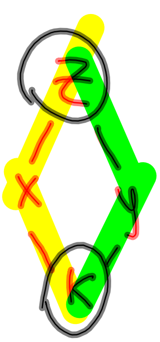
$|x| = -x$

$$z = \begin{cases} 0 \\ \frac{-x}{y} \end{cases} \qquad \frac{\partial z}{\partial x} = \begin{cases} 0 \\ \frac{-1}{y^2} \end{cases}$$

$$\frac{\partial z}{\partial y} = \begin{cases} 0 \\ \frac{+2x}{y^3} \end{cases}$$

$z = xy \qquad x = 2k \qquad y = k^2 + 1$

$$\frac{dz}{dk} = 6k^2 + 2$$



$$\frac{dz}{dk} = \frac{\partial z}{\partial x} \cdot \frac{dx}{dk} + \frac{\partial z}{\partial y} \cdot \frac{dy}{dk}$$

$$= y\underbrace{(2)}_{x'} + x\underbrace{(2k)}_{y'}$$

$$z = \underbrace{f(k)}_{x}\underbrace{g(k)}_{y}$$

$$= (k^2+1)2 + (2k)(2k)$$

$$= 6k^2 + 2$$

$z = \sin(x + y^2)$, $x = s + k^2$, $y = 2s$

$$\frac{dz}{ds} = \frac{dz}{dx} \cdot \frac{dx}{ds} + \frac{dz}{dy} \cdot \frac{dy}{ds}$$

$$\frac{dz}{ds} = \cos(x+y^2) + \cos(x+y^2)(2y)(2)$$

$$= \underline{\cos(x+y^2) + 4y\cos(x+y^2)}$$

$\frac{dz}{dk}$

$\cos(4s^2 + s + k^2) \cdot 2k$