

3.6 - Part 2.

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

E.g. $y = \sin(\cos(x))$; find $\frac{dy}{dx} = ?$

$u = \cos(x)$
 $y = \sin(u)$
 $\frac{dy}{du} = \cos(u)$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dx}$$

$$= \cos(u) \cdot (-\sin(x))$$

$$= \cos(\cos(x)) \cdot (-\sin(x))$$

Sep 28-4:06 PM

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dx}$$

$y = \sin(\cos(7x))$; $\frac{dy}{dx} = ?$

$v = 7x$
 $u = \cos(v)$
 $y = \sin(u)$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dx}$$

$$= \cos(u) \cdot (-\sin(v)) \cdot 7$$

$$= -7 \cos(\cos(7x)) \cdot \sin(7x)$$

Sep 28-4:13 PM

$y = \sin(\sin(\sin(x)))$; $\frac{dy}{dx} = ?$

$v = \sin(x)$
 $u = \sin(v)$
 $y = \sin(u)$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dx}$$

$$= \cos(u) \cdot \cos(v) \cdot \cos(x)$$

$$= \cos(\sin(\sin(x))) \cdot \cos(\sin(x)) \cdot \cos(x)$$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dw} \cdot \frac{dw}{dz} \cdot \frac{dz}{dt} \cdot \frac{dt}{dx}$$

Sep 28-4:19 PM

$y = \cos(\sin(\tan(\pi x)))$; $\frac{dy}{dx} = ?$

$z = \pi x$
 $w = \tan(z)$
 $v = \sin(w)$
 $u = \sqrt{v}$
 $y = \cos(u)$

$$\frac{dy}{dx} = \frac{dy}{du} \cdot \frac{du}{dv} \cdot \frac{dv}{dw} \cdot \frac{dw}{dz} \cdot \frac{dz}{dx}$$

$$= -\sin(u) \cdot \frac{1}{2\sqrt{v}} \cdot \cos(w) \cdot \sec^2(z) \cdot \pi$$

$$\frac{dy}{dx} = -\sin(\sqrt{\sin(\tan(\pi x))}) \cdot \frac{1}{2\sqrt{\sin(\tan(\pi x))}} \cdot \cos(\tan(\pi x)) \cdot \sec^2(\pi x) \cdot \pi$$

Sep 28-4:24 PM