

Chain Rule--Day 2

Questions and More Examples

#17/27

$$y = (1 + \cos^2 x)^6$$

$$\frac{dy}{dx} = 6(1 + \cos^2 x)^5 (2 \cos x)(-\sin x)$$

$$= -12(1 + \cos^2 x) \cos x \sin x$$

#12/26

$$s(t) = \sqrt[4]{\frac{t^3+1}{t^3-1}} = \left(\frac{t^3+1}{t^3-1}\right)^{1/4}$$

$$s'(t) = \frac{1}{4} \left(\frac{t^3+1}{t^3-1}\right)^{-3/4} \left[\frac{(t^3-1)(3t^2) - (t^3+1)(3t^2)}{(t^3-1)^2} \right]$$

$$s'(t) = \frac{\frac{(t^3-1)(3t^2) - (t^3+1)(3t^2)}{(t^3-1)^2}}{4 \sqrt[4]{\left(\frac{t^3+1}{t^3-1}\right)^3}}$$

#26/29

$$y = (x^3 - x^2 + x - 1)^{10} \quad @ (1, 0).$$

$$\frac{dy}{dx} = 10(x^3 - x^2 + x - 1)^9 (3x^2 - 2x + 1)$$

$$\left. \frac{dy}{dx} \right|_{x=1} = 10(0) = 0 \rightarrow m_T = 0$$

$$\therefore y - 0 = 0(x - 1)$$

$$y = \cos^3 \theta^2$$

$$\frac{dy}{dx} = [3\cos^2 \theta^2] [-\sin \theta^2] [2\theta]$$

$$f(x) = \sqrt{1 + \sqrt{1 + rx}}$$

$$f'(x) = \frac{\frac{1}{2rx}}{2\sqrt{1+rx}} \cdot \frac{1}{2\sqrt{1+\sqrt{1+rx}}}$$

$$f(x) = \frac{\sin^2 x^3}{x^2}$$

$$f'(x) = \frac{(x^2)(2 \sin x^3)(\cos x^3)(3x^2) - (\sin^2 x^3)(2x)}{(x^2)^2}$$

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

$$h'(x) = [\cos(\cos(\sin x))] [-\sin(\sin x)] \cos x$$

$$y = \sin\left(\frac{t}{\sqrt{t+1}}\right)$$

$$\frac{dy}{dt} = \left[\cos\left(\frac{t}{\sqrt{t+1}}\right) \right] \left[\frac{\sqrt{t+1} - (t) \frac{1}{2\sqrt{t+1}}}{t+1} \right]$$

$$f(x) = \frac{2}{\sqrt{\sin^2 x}}$$

$$= 2(\sin^2 x)^{-1/2}$$

$$f'(x) = -(\sin^2 x)^{-3/2} (2 \sin x \cos x)$$

$$= -\frac{2 \sin x \cos x}{\sqrt{(\sin^2 x)^3}}$$