

$$\log_2 \sqrt[3]{4 \sin^2 [\ln(x^3+1) - \ln(x+1)] + \cos^2 [\ln(x^2-x+1)]}$$

$$= \frac{1}{3} \log_2 4 \sin^2 [\ln(x^3+1) - \ln(x+1)] + \cos^2 [\ln(x^2-x+1)]$$

$$x^3+1 = (x+1)(x^2-x+1)$$

$$\ln \frac{x^3+1}{x+1} = \ln \frac{(x+1)(x^2-x+1)}{x+1}$$

$$= \frac{1}{3} \log_2 4 \sin^2 (\dots) + \cos^2 (\dots)$$

$$= \frac{1}{3} \log_2 4 = \frac{1}{3} (2) = \frac{2}{3} = F(x) \Rightarrow F'(x) = 0$$

$$f'(c) = \lim_{x \rightarrow c} \frac{f(x) - f(c)}{x - c}$$

$$f(x) = |x-3| + 1 \quad ; \quad (3, 1)$$

$$\lim_{x \rightarrow 3} \frac{|x-3| + 1 - 1}{x-3} = \lim_{x \rightarrow 3} \frac{|x-3|}{x-3} = \begin{cases} \lim_{x \rightarrow 3^-} \frac{|x-3|}{x-3} = -1 \\ \lim_{x \rightarrow 3^+} \frac{|x-3|}{x-3} = 1 \end{cases}$$

Because the left- and right-hand limits as x approaches 3 are different, the limit in general, and hence the derivative defined by that limit, do not exist at the point $(3, 1)$.

$$f(x) = \sin(2x)$$

$$f'(x) = [\cos(2x)](2)$$

$$m = f'\left(\frac{\pi}{2}\right) = 2 \cos\left(2 \cdot \frac{\pi}{2}\right) = 2(-1)$$

$$y - 0 = -2\left(x - \frac{\pi}{2}\right) \Rightarrow \boxed{y = -2x + \pi}$$

$$4(a) \quad s'(t) = -32t - 4$$

$$s'\left(\frac{1}{2}\right) = -20 \text{ ft/s}$$

$$(b) \quad \frac{s\left(\frac{3}{4}\right) - s(0)}{\frac{3}{4} - 0} = \frac{-16\left(\frac{3}{4}\right)^2 - 4\left(\frac{3}{4}\right) + 12 - 12}{\frac{3}{4}}$$

$$= \boxed{-16 \text{ ft/s}}$$

Find y' implicitly in terms of x and y .

$$x^2y + 3xy^3 = 5x^3y^2$$

$$\frac{d}{dx} [x^2y + 3xy^3] = \frac{d}{dx} [5x^3y^2]$$

$$(2xy + x^2y') + (3y^3 + 3x \cdot 3y^2y') = 15x^2y^2 + 5x^3 \cdot 2yy'$$

$$x^2y' + 9xyy' - 10xyy' = 15x^2y^2 - 2xy - 3y^3$$

$$y' [x^2 + 9xy^2 - 10xy] = 15x^2y^2 - 2xy - 3y^3$$

$$y' = \frac{15x^2y^2 - 2xy - 3y^3}{x^2 + 9xy^2 - 10xy}$$

$$\cos x + \sin y = \tan(xy)$$

$$-\sin x + (\cos y)y' = [\sec^2(xy)](1 \cdot y + x \cdot y')$$

$$y' \cos y - xy' \sec^2(xy) = y \sec^2(xy) + \sin x$$

$$y' = \frac{y \sec^2(xy) + \sin x}{\cos y - x \sec^2(xy)}$$

HW #7 (due Fri, 9 Jan)

2.5 # 1-39 odd; 43, 47 - Implicit Differentiation

2.6 # 15-23 odd - Related Rates

2.6 # 25, 27, 35 - Related Rates (more challenging problems)

Quiz #4 - Fri, 9 Jan

HW #8 (due Fri, 16 Jan)

3.1 # 17-31 odd - Absolute Extrema on an Interval

3.2 # 7-19 odd - Rolle's Theorem

3.2 # 31-37 odd - Mean Value Theorem

3.3 # 11-31 odd - Increasing, Decreasing, and Relative Extrema

Quiz #5 - Fri, 16 Jan?

HW #9 (due Test Day)

3.4 #11-25 odd - Inflection Points and Concavity

3.5 #15-31 odd - Limits at Infinity

Test #3 - Wed, 21 Jan?