$$f(x) = \sqrt{1+\sqrt{x-2}}$$
$$= \left(1+(x-2)^{\frac{1}{2}}\right)^{\frac{1}{2}}$$

$$\Rightarrow f'(x) = \frac{1}{2}\left(1+(x-2)^{\frac{1}{2}}\right)^{-\frac{1}{2}}\left(\frac{1}{2}(x-2)^{-\frac{1}{2}}\right)(1)$$

3.4 #23

$$r = (\csc\theta + \cot\theta)^{-1} \longrightarrow$$

$$\frac{dr}{d\theta} = -(\csc\theta + \cot\theta)^{-2}(-\csc\theta\cot\theta - \csc^2\theta)$$

$$\frac{\csc\theta\cot\theta + \csc^2\theta}{(\csc\theta + \cot\theta)^2}$$

$$= \frac{\csc\theta(\cot\theta + \csc\theta)}{(\csc\theta + \cot\theta)^2}$$

$$= \frac{\csc\theta}{\csc\theta + \cot\theta}$$

$$\frac{dy}{dx} = y'$$

$$y\sin\left(\tfrac{1}{y}\right) = 1 - xy$$

$$y\sin(y^{-1}) = 1 - xy$$

$$y'\sin(y^{-1}) + y\cos(y^{-1})(-1y^{-2}y') = -1y - xy'$$

$$y'\sin(y^{-1}) - y^{-1}y'\cos(y^{-1}) = -y - xy'$$

$$y'\sin(y^{-1}) - y^{-1}y'\cos(y^{-1}) + xy' = -y$$

$$y'\left(\sin(y^{-1}) - y^{-1}\cos(y^{-1}) + x\right) = -y$$

STOP!

$$y' = \frac{-y}{\sin(y^{-1}) - y^{-1}\cos(y^{-1}) + x}$$

$$= \frac{-y}{\sin\left(\frac{1}{y}\right) - \frac{1}{y}\cos\left(\frac{1}{y}\right) + x}$$

$$\frac{d}{dx}[xy] = \frac{dx}{dx}y + x\frac{dy}{dx}$$

$$= \underbrace{1y + xy'} = \underline{y + xy'}$$

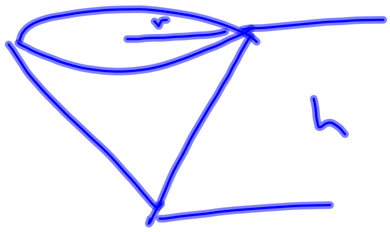
$$\frac{d}{dx}[y^5] = 5y^4\frac{dy}{dx} = 5y^4y'$$

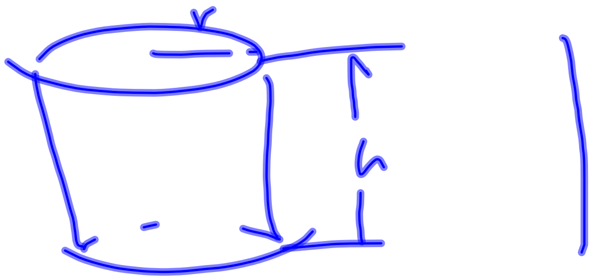
$$(fg)' = f'g + fg'$$

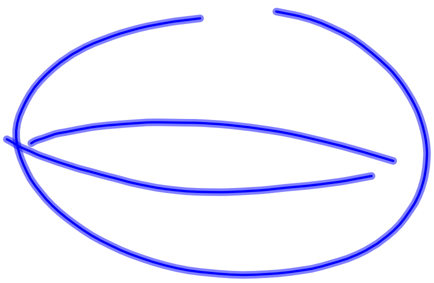
3.7 1, 4, 7, 10, 13, 16, 19
... 22, 30, 33, 36, 39, 42, 50 → Ask!

3.8 #s 1, 4, 7, 9, 10, 12, 17, 23

You probably should do more Geometry formulas.







Surface area
Volume.

§3.6

59 $y = \left(1 + \frac{1}{x}\right)^3 = (1 + x^{-1})^3$

$\Rightarrow y' = \underbrace{3(1 + x^{-1})^2}_{f}\underbrace{(-x^{-2})}_{g} \Longrightarrow y'' =$

$\underbrace{6(1 + x^{-1})^1(-x^{-2})}_{f'}\underbrace{(-x^{-2})}_{g} + \underbrace{3(1 + x^{-1})^2}_{f}\underbrace{(2x^{-3})}_{g'}$

Sep 26-12:37 PM

3.7 #s 29-38

29 $x^2 + xy - y^2 = 1$ $(2,3)$

$2^2 + 2(3) - 3^2 = 10 - 9 = 1$ ✓

$2x + y + xy' - 2yy' = 0$

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

$$y'\Big|_{(x,y)=(2,3)} = \frac{-3-2(2)}{2-2(3)} = \frac{-7}{-4} = \frac{7}{4} = m_{tan}$$

$\Longrightarrow$ $y = \frac{7}{4}(x-2) + 3$ is tangent line.

$\Longrightarrow$ $y = -\frac{4}{7}(x-2) + 3$ is normal line

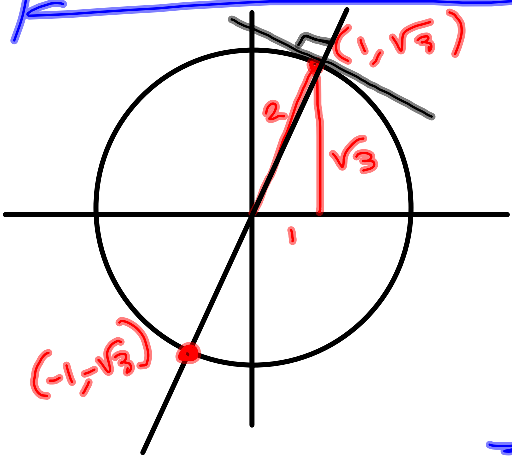
$y = m(x - x_1) + y_1$

Sep 26-12:41 PM

Like #45

Find normal to $x^2+y^2=4$ @ $(1,\sqrt{3})$

Find where it intersects the curve.




$$2x+2yy'=0$$

$$y'=-\frac{x}{y}$$

$$y'\Big|_{(x,y)=(1,\sqrt{3})}=-\frac{1}{\sqrt{3}}=m_{tan}$$

$$\Longrightarrow m_{\perp}=\sqrt{3}$$

$$\Longrightarrow y=\sqrt{3}(x-1)+\sqrt{3}$$

is normal line

$$y=\sqrt{3}x-\sqrt{3}+\sqrt{3}$$

$$\left.\begin{array}{l} y=\sqrt{3}x \\ x^2+y^2=4 \end{array}\right\}$$

$$x^2+(\sqrt{3}x)^2=4$$

$$x^2+3x^2=4$$

$$4x^2=4$$

$$x^2=1$$

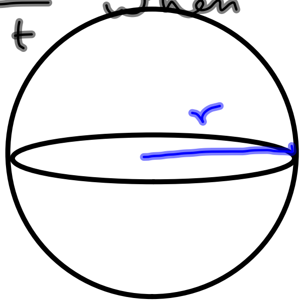
$x=\pm 1$ & $y=\sqrt{3}(1)=\sqrt{3}$

OR $y=\sqrt{3}(-1)=-\sqrt{3}$

$\Longrightarrow$ $(-1,-\sqrt{3})$ is the other intersection.

3.8 example: Better lead-in

Given $\frac{dV}{dt} = 12 \frac{cm^3}{s}$. Find $\frac{dr}{dt}$ when $r = 5$.




$V = \frac{4}{3}\pi r^3$

$\frac{dV}{dt} = 4\pi r^2 \frac{dr}{dt}$

$\frac{d}{dt}\left[r^3\right] = 3r^2 \frac{dr}{dt}$

Chain Rule

$12 = 4\pi (5)^2 \frac{dr}{dt}$

$\frac{dr}{dt} = \frac{12}{25 \cdot 4\pi} = \frac{3}{25\pi} \frac{cm}{s}$

$V = IR$ 3.8 #15

$\quad\;\; f \;\; g$

(a) $\frac{dV}{dt} = 1 \frac{\text{volt}}{s}$

(b) $\frac{dI}{dt} = -\frac{1}{3} \frac{\text{amp}}{s}$

(c) $\frac{dV}{dt} = \frac{dI}{dt} \cdot R + I \cdot \frac{dR}{dt}$

$f' \; g + f \; g'$

(d) Find $\frac{dR}{dt}$ when $V=12$, $I=2$

$$\sec\sqrt{\theta} \quad \tan\left(\frac{1}{\theta}\right)$$

$$\frac{d}{d\theta}\left[\sec\left(\theta^{\frac{1}{2}}\right)\tan\left(\theta^{-1}\right)\right]$$

$$= \left(\sec\left(\sqrt{\theta}\right)\tan\left(\sqrt{\theta}\right)\right)\left(\frac{1}{2}\frac{1}{\sqrt{\theta}}\right)\tan\theta^{-1}$$

$$+\left(\sec\left(\theta^{\frac{1}{2}}\right)\right)\left(\sec^2\left(\theta^{-1}\right)\right)\left(-\theta^{-2}\right)$$

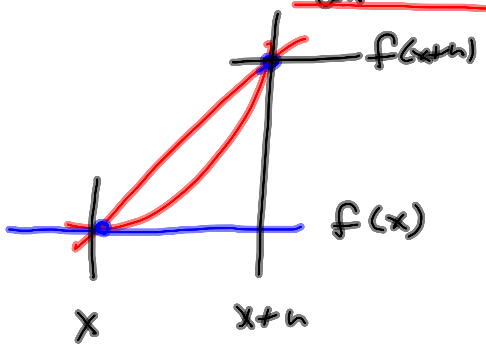
$$\frac{d}{dx}\left[x^2 + y^2 = 4\right] \qquad \frac{d \sin x}{dx}$$

$$2x + 2y\frac{dy}{dx}$$

$$\frac{d}{dv}\left[v^2\right] \qquad \frac{d(y^2)}{dy}$$

$$\frac{d}{dx}\left[\sin(5x)\right] = \cos(5x)\cdot 5x$$

$$\boxed{\frac{d}{dx}\left[(\sin x)^2\right]} = \boxed{\left(2\sin(x)^1\right)}\boxed{\cos x}$$




$$\frac{f(x+h)-f(x)}{h} \xrightarrow{h \to 0} f'(x)$$

$$\frac{d\,(\sin(x))^2}{\sin(x)}$$

$m =$