Abdon Marcaby	[redacted] book HW 07 3.5	Oct 11

Question 64

Implicit Differentiation

$(12, 3)$
$x_1 \quad y_1$

$$\boxed{x^2+4y^2}=\boxed{36} \longrightarrow 2x + 8y \cdot y' = 0$$

$-2x \qquad -2x$

$$\frac{8y \cdot y'}{8y} = \frac{-2x}{8y} \begin{matrix}\div 2\\ \div 2\end{matrix}$$

$$\boxed{y' = \frac{-x}{4y}}$$

(x, y)

$y-3$

$4y \quad 4y^2-12y$

$$\frac{-12}{4(3)} = \boxed{-1}$$

$$\cancel{\frac{y-13}{1x-12}} = \cancel{\frac{-x}{4y}}$$

$$\frac{y-3}{x-12} = \frac{-x}{4y}$$

$x-12$

$-x \quad -x^2+12x$

$x^2+4y^2=36$

$-4y^2$

$x^2=36-4y^2$

$-x^2+12x = 4y^2-12$

$+12y$

$-(36-4y^2)$

$+x^2 \quad +12x$

$-36+4y^2+12x = 4y^2-12$

$+12 \qquad +12$

$x=0$

$y=3$

$$\frac{3-3}{0-12} = \frac{0}{-12} = 0 = \frac{-a}{4b}$$

$$\frac{b-3}{a-12}$$

$4b^2-12b=-a^2+12a$

$y-3 = 0(x-0)$

$y-3=0$

$+3 \quad +3$

$y=3$

$$\boxed{\begin{matrix}(0,3)\\ \left(\frac{24}{5}, -\frac{9}{5}\right)\end{matrix}}$$

$-24+4y^2+12x = \cancel{4y^2}$

$-4y^2 \qquad \cancel{-4y^2}$

$-24+12x=0$

Textbook HW07 – 3.6

Question 85

$\left[f(x)\right]' = \left[x+e^x\right]'$, find $f^{-1\prime}(1)$

$f(x)=1 \quad f^{-1\prime}(y) = \dfrac{1}{f'(f^{-1}(y))}$

$1 = x+e^x,\ x=0$

$f'(x) = 1+e^x$

$f'(0) = 1+e^0 = 2$

$f^{-1\prime}(1) = \dfrac{1}{f'(f^{-1}(1))} = \dfrac{1}{f'(0)} = \boxed{\dfrac{1}{2}}$

$\left[f(x)\right]'\left[x^3+3\sin(x)+2\cos(x)\right]'$ find $f^{-1\prime}(2)$ Q86

$2 = x^3+3\sin(x)+2\cos(x)$

$x=0$

$0^3+3\sin(0)+2\cos(0)$

$0+0+2(1) = 2 = f(0)$

$f'(x) = 3x^2+3\cos(x)-2\sin(x)$

$f'(0) = 3(0)^2+3\cos(0)-2\sin(0)$

$0+3(1)-0$

$0+3$

$3-0$

$f'(0)=3$

$\dfrac{1}{f'(0)} = \boxed{\dfrac{1}{3}}$

Chapter 3.9

Question 29

$\dfrac{dV}{dt} = 30\ ft^3/min$

$h = 10ft,\ d=h$

$\dfrac{dV}{dt} = \dfrac{1}{4}\pi h^2 \cdot \dfrac{dh}{dt}$

$30 = \dfrac{1}{\cancel{4}}\pi(10)^2 \cdot \dfrac{dh}{dt}\ \cancel{(4)}$

$\dfrac{12\cancel{0}}{10\cancel{0}\pi} = \dfrac{10\cancel{0\pi} \cdot \frac{dh}{dt}}{\cancel{100\pi}}$

$\dfrac{12}{10\pi} = \dfrac{dh}{dt} \rightarrow \boxed{\dfrac{dh}{dt} = \dfrac{6}{5\pi} = 0.38197}$

Question 48

$\left[\sin\theta\right]' = \left[\dfrac{y}{10}\right]' \quad \dfrac{d\theta}{dt} = \pi/min = \theta'$

$\cos\theta \cdot \theta' = \frac{1}{\cancel{10}}y'\ \cancel{(10)}$

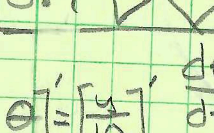
$10\cos\theta \cdot \theta' = y'$

$y=8 \quad c=10$

$x=6$

$10\left(\dfrac{8}{10}\right)\cdot\pi = y' = \boxed{8\pi}$

Question 46



$\left[\tan\theta\right]'\left[\dfrac{1}{3}\right]' \quad 8\pi = \dfrac{d\theta}{dt}$

$\sec^2\theta \cdot \theta' = \dfrac{1}{3}(3)$

$3\sec^2\theta \cdot \theta' =$

$\left(\dfrac{1}{\cos\theta}\right)^2 \cdot (8\pi) \cdot 3 = x'$

$\left(\dfrac{1}{\cos\theta}\right)^2 24\pi$

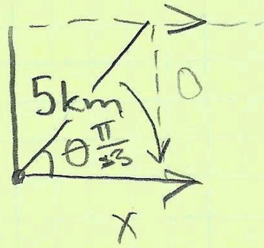
$\theta = 1 \quad \left(\dfrac{\frac{1}{3}}{\sqrt{10}}\right)^2 \quad \left(\dfrac{\sqrt{10}}{3}\right)^2 \quad \dfrac{10}{9} \cdot 24\pi$

$3\overline{)240}$ 80

$\dfrac{240\pi}{9} = \boxed{\dfrac{80\pi}{3} = x'}$

Ahdan Morales | | Oct 11

Question 47



$\pi/6 \,/\, \text{min} = \frac{d\theta}{dt}$

$5 = h$

$\left[\tan(\theta)\right]' = \left[\frac{h}{x}\right]'$

$\sec^2\theta \cdot \theta' = \frac{-h}{x^2} \cdot x'$

$\tan\theta = \frac{h}{x}\,(x)$

$\frac{x \tan\theta = h}{\tan\theta} \quad \frac{}{\tan\theta} = x = \frac{5}{\tan(\frac{\pi}{3})} = \frac{5}{\sqrt{3}}$

$\left(\frac{1}{(\frac{1}{2})}\right)^2 = \left(\frac{1}{\cos(\frac{\pi}{3})}\right)^2$

$(2)^2 = 4$

$\frac{x^2 \sec^2\theta \cdot \theta'}{-h} = \frac{-h \cdot x'}{-h}$

$\frac{x^2 \sec^2\theta \cdot \theta'}{-h} = x'$

$25 \times 4 = 100$

$\frac{\frac{25}{3}(4) \cdot \frac{\pi}{6}}{-5} = \frac{\frac{100\pi}{18}}{-5} = \frac{100\pi}{18} \cdot \frac{1}{-5} = \frac{10\cancel{0}\pi}{-9\cancel{0}}$

$$\boxed{\frac{10\pi}{9} = x' = 3.49 \text{ km/min}}$$

Additional Questions
HW 07

Question #3

$$\frac{dP}{dt} = k \cdot P(t) \rightarrow \frac{dP}{dt} = k \cdot y \rightarrow y = y(0) \cdot e^{k(t)}$$

$k = 0.7$

$P(0)$ or $P_I = 1000$ $\rightarrow$ $\boxed{P(t) = 10000 \cdot e^{0.7(t)}}$

Question #4

$$[f(x)]' = [|\ln(0.5x + 0.5e^{-1})|]' \rightarrow [-(\ln(0.5x + 0.5e^{-1}))] =$$

$$\frac{-1}{0.5x + 0.5e^{-1}} \cdot [0.5x + 0.5e^{-1}]' = \frac{-\cancel{0.5}}{\cancel{0.5}x + \cancel{0.5}e^{-1}} \rightarrow \frac{-1}{x + e^{-1}} = \frac{dy}{dx}$$

$x = e^{-1}$ value

$y = 1 = |\ln(0.5(e^{-1}) + 0.5e^{-1})| = \ln(e^{-1}) = |-1| = 1$

$y - 1 = \frac{-1}{2e^{-1}}(x - e^{-1})$

$+1 \qquad +1$

$y = \frac{-1}{2e^{-1}}(x - e^{-1}) + 1$

$0 = \frac{-1}{2e^{-1}}(x - e^{-1}) + 1$

$-1 \qquad -1$

$-1 = \frac{-1}{\cancel{2e^{-1}}}(x - e^{-1})\ \cancel{(2e^{-1})}$

$\frac{-2e^{-1}}{-1} = \frac{-(x - e^{-1})}{-1}$

$2e^{-1} = x - e^{-1}$

$+e^{-1} \qquad +e^{-1}$

$3e^{-1} = x$

$\boxed{\begin{array}{l} x\text{-intercept} = (3e^{-1}, 0) \\ y\text{-intercept} = (0, 1.5) \end{array}}$

$y = \frac{-1}{2e^{-1}}(-e^{-1}) + 1$

$y = \frac{\cancel{e^{-1}}}{2\cancel{e^{-1}}} + 1$

$y = \frac{1}{2} + 1$

$y = 1.5$

When $x = 0$; $y = 1.5$

Question #2

$y^3 - 4xy = 8$

$3y^2 \cdot y' - 4y - 4xy' = 0$

$+4y \qquad +4y$

$3y^2 y' - 4xy' = 4y$

$\frac{y'(3y^2 - 4x)}{(3y^2 - 4x)} = \frac{4y}{(3y^2 - 4x)}$

$y' = \frac{4y}{3y^2 - 4x}$

$\frac{y_2 - y_1}{x_2 - x_1} = \frac{b - 0}{a + 3} \rightarrow \frac{b}{a+3} = \frac{4b}{3b^2 - 4a} \rightarrow 4ab + 12b = 3b^3 - 4ab$

$-4ab - 12b \qquad -4ab$

$0 = 3b^3 - 8ab - 12b$

$b^3 - 4ab = 8$

$-b^3 + 4ab \qquad -b^3$

$\frac{b^3 - 4ab}{-1} = \frac{8 - b^3}{-1}$

$\frac{4ab}{4} = \frac{-8 - b^3}{4}$

Next Page

$ab = \frac{-8 - b^3}{-4}$

$3(4ab + 8) - 8ab - 12b$

$0 = 12ab + 24 - 8ab - 12b$

$12\left(\frac{-8 - b^3}{4}\right) + 24 - 8\left(\frac{-8 - b^3}{4}\right)$

Next page

$b^3 - 4ab = 8 \quad , \quad 0 = 3b^3 - 8ab - 12b$

$\frac{-4ab}{-1} = \frac{8 - b^3}{-1}$

$(2)4ab = -8 + b^3(2)$

$8ab = -16 + 2b^3$

$3b^3 + 16 - 2b^3 - 12b$

$0 = b^3 - 12b + 16$

$-16 = b(b^2 - 12) - 16$

$$\boxed{\begin{array}{l} b = 2, \ a = 0 \\ b = -4 \ a = \frac{9}{2} \end{array}}$$

$\downarrow$

$x = 0, \ y = 2$

$x = \frac{9}{2}, \ y = -4$

$y - 2 = \frac{4(2)}{3(2)^2 - 4(0)}(x - 0)$

$\frac{8}{12} \quad \frac{4}{6} \quad \frac{2}{3}(x - 0)$

$$\boxed{y = \frac{2}{3}x + 2}$$

$(2)^3 - 4a(2) = 8$

$8 - 4a(2)$

$8 - 8a = 8$
$-8 \qquad -8$

$\frac{-8a}{-8} = 0$

$a = 0$

$(-4)^3$

$-64 + 16a = 8$
$+64 \qquad +64$

$\frac{16a}{16} = \frac{72 \div 2}{16 \div 2} \quad \frac{36 \div 4}{8 \div 4} \quad \frac{9}{2}$

$a = \frac{9}{2}$

$\begin{array}{r} 16 \\ \times 3 \\ \hline 48 \end{array}$

$\frac{12}{5} \quad \frac{72 \div 2}{30 \div 2} \quad \frac{36 \div 3}{15 \div 3}$

$2\overline{)72}$ 36, 6

$16\overline{)72}$

$2\overline{)72}$ 36, -6, 12

$\begin{array}{r} 16 \\ \times 4 \\ \hline 64 \end{array}$

$\begin{array}{r} 16 \\ \times 2 \\ \hline 2 \end{array}$

$\begin{array}{r} 48 \\ +18 \\ \hline 66 \end{array}$

$\frac{36}{2}$

$2\overline{)36}$ 18, -2, 1

$y + 4 = \frac{4(-4)}{3(-4)^2 - 4(\frac{9}{2})}(x - \frac{9}{2})$

$\frac{-16}{48 - 18} = \frac{-16}{30} = \frac{-8}{15}$

$y + 4 = \frac{-8}{15}(x - \frac{9}{2}$

$y + 4 = -\frac{8}{15}x + \frac{12}{5} - \frac{20}{5}$
-4

$$\boxed{y = -\frac{8}{15}x - \frac{8}{5}}$$


SOFTBALL
Softballs of Steel
Softball
A Pope-Morales Production
Softball
SAM
Softball
You'll Work For Us Someday
Softball
The Lady Wompus Cats
INTRAMU