

Homework 3.6

pg. 178 #1-7 odd, 13, 27

pg. 186 #1-19 odd, 51

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

$$y' = -\frac{1}{\sqrt{1-(x^2)^2}} \cdot 2x$$

$$y' = \frac{-2x}{\sqrt{1-x^4}}$$

3) $y = \sin^{-1}\sqrt{2t}$

$$y' = \frac{1}{\sqrt{1-(\sqrt{2t})^2}} \cdot \left[\frac{1}{2}(2t)^{-\frac{1}{2}} \cdot 2 \right]$$

$$y' = \frac{1}{\sqrt{1-2t}} \cdot (2t)^{-\frac{1}{2}}$$

$$y' = \frac{\frac{1}{\sqrt{2t}}}{\sqrt{1-2t}} = \frac{1}{\sqrt{2t} \cdot \sqrt{1-2t}}$$

5) $y = \sin^{-1}\frac{3}{t^2} \rightarrow y = \sin^{-1}(3t^{-2})$

$$y' = \frac{1}{\sqrt{1-(\frac{3}{t^2})^2}} \cdot -6t^{-3}$$

$$y' = \frac{-6t^{-3}}{\sqrt{1-\frac{9}{t^4}}} = \frac{-6}{t^3\sqrt{1-\frac{9}{t^4}}}$$

7) $y = x\sin^{-1}x + \sqrt{1-x^2}$

$$y' = x\left(\frac{1}{\sqrt{1-x^2}}\right) + (1)(\sin^{-1}x) + \frac{1}{2}(1-x^2)^{-\frac{1}{2}} \cdot (-2x)$$

$$y' = \frac{x}{\sqrt{1-x^2}} + \sin^{-1}x + \frac{-2x}{2\sqrt{1-x^2}}$$

$$y' = \frac{x}{\sqrt{1-x^2}} + \sin^{-1}x - \frac{x}{\sqrt{1-x^2}} = \sin^{-1}x$$

13) $y = \sec^{-1}(2s+1)$

$$y' = \frac{1}{|2s+1|\sqrt{(2s+1)^2-1}} \cdot 2$$

$$y' = \frac{2}{|2s+1|\sqrt{4s^2+4s+1-1}}$$

$$y' = \frac{2}{|2s+1|\sqrt{4s^2+s}} = \frac{1}{|2s+1|\sqrt{s^2+s}}$$

27) a) $y = \tan x \left(\frac{\pi}{4}, 1\right)$

$$y' = \sec^2 x = \sec^2\left(\frac{\pi}{4}\right) = \left(\frac{1}{\sqrt{2}}\right)^2 = \frac{4}{2} = 2$$

$$y-1 = 2\left(x-\frac{\pi}{4}\right)$$

b) $y = \tan^{-1}(x) \left(1, \frac{\pi}{4}\right)$

$$y' = \frac{1}{1+x^2} = \frac{1}{1+1} = \frac{1}{2}$$

$$y-\frac{\pi}{4} = \frac{1}{2}(x-1)$$

1) $y = 2e^x$

$$y' = 2e^x$$

3) $y = e^{-x}$

$$y' = e^{-x} \cdot -1 = -e^{-x}$$

5) $y = e^{\frac{2x}{3}}$

$$y' = e^{\frac{2x}{3}} \cdot \frac{2}{3} = \frac{2}{3}e^{\frac{2x}{3}}$$

7) $y = xe^2 - e^x$

$$y' = x(0) + (1)e^2 - e^x$$

$$y' = e^2 - e^x$$

9) $y = e^{\sqrt{x}}$

$$y' = e^{\sqrt{x}} \cdot \frac{1}{2}x^{-\frac{1}{2}}$$

$$y' = e^{\sqrt{x}} \cdot \frac{1}{2\sqrt{x}}$$

11) $y = 8^x$

$$y' = 8^x \ln(8)$$

$$13) y = 3^{\csc x}$$

$$y' = 3^{\csc x} \cdot \ln(3) \cdot (-\csc x \cot x)$$

$$15) y = \ln(x^2)$$

$$y' = \frac{1}{x^2} \cdot 2x = \frac{2x}{x^2} = \frac{2}{x}$$

$$17) y = \ln\left(\frac{1}{x}\right)$$

$$y' = \frac{1}{x} \cdot -x^{-2} = -\frac{x}{x^2} = -\frac{1}{x}$$

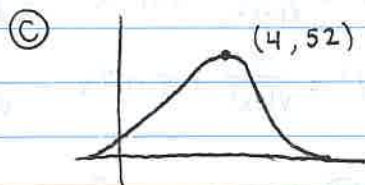
$$19) y = \ln(\ln x)$$

$$y' = \frac{1}{\ln x} \cdot \frac{1}{x} = \frac{1}{x \ln x}$$

$$51) \textcircled{a} P(0) = \frac{300}{1+2^{4-0}} = \frac{300}{1+2^4} = \frac{300}{17} \approx 18 \text{ students}$$

$$\textcircled{b} P'(t) = \frac{(1+2^{4-t})(0) - (300)(2^{4-t} \ln(2) \cdot -1)}{(1+2^{4-t})^2} = \frac{(-300)(-2^{4-t} \ln(2))}{(1+2^{4-t})^2}$$

$$P'(4) = 52 \text{ students/day}$$



After 4 days
Rate of 52 students/day