Assignments for the Week of Sept 26:

- Read 2.4, 5.1,5.4,5.5,5.6 (only derivative examples from Ch 5)
- 45 minutes of Khan Academy
- Due Fri. 30 Sept:

• 2.4 #7-33 odd; 43-89 odd	Chain rule
• 5.1 #41-59 odd; 69,71	Logarithmic functions
• 5.4 #33-51 odd; 59, 61	Exponential functions

Due Test Day:

• 5.5 #37-69 odd	Log and exp functions with other bases
• 5.6 #39-63 odd	Inverse trig functions

2nd test: 6th per - Wed. 10/5; 8th per - Tues. 10/4

(derivatives, average & instantaneous rates of change, slope & equation of tangent lines), Intermediate Value Theorem, limit of difference quotient & alternate limit definition of derivative)

60. $g(t) = 5\cos^2 \pi t$ $= 5[\cos \pi t]^2$

$g'(t) = (10\cos \pi t)(-\sin \pi t)(\pi)$

66. $y = \sin \sqrt[3]{x} + \sqrt[3]{\sin x}$ $= \sin(x^{1/3}) + (\sin x)^{1/3}$

$y' = (\cos(x^{1/3}))\cdot(\frac{1}{3}x^{-2/3}) + \frac{1}{3}(\sin x)^{-2/3}\cdot\cos x$

5.4

46. $g(t) = e^{-3/t^2}$ $= e^{-3t^{-2}}$

$g'(t) = e^{-3t^{-2}} \cdot 6t^{-3}$

5.5

46. $f(t) = \frac{3^{2t}}{t}$ $= (3^{2t})(t^{-1})$

$$f'(t) = \left[3^{2t} \ln 3 \cdot 2\right](t^{-1}) + (3^{2t})(-t^{-2})$$

54. $y = \log_{10} \frac{x^2 - 1}{x}$ $= \log_{10}(x^2-1) - \log_{10} x$

$$y' = \frac{1}{(x^2-1)\ln 10} \cdot (2x) - \frac{1}{x \ln 10}$$

Inverse Trig Functions

$y = \sin x$

ratio of sides ↑ angle ↑

$y = \sin^{-1} x \neq \frac{1}{\sin x}$

$y = \arcsin x$

angle ↑ ratio of sides ↑

5.8

44. $f(x) = \operatorname{arcsec} 2x$

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

48. $h(x) = x^2 \arctan x$

$$h'(x) = 2x \arctan x + x^2 \cdot \frac{1}{1+x^2}$$

52. $y = \ln(t^2+4) - \frac{1}{2}\arctan\frac{t}{2}$

$$y' = \frac{1}{t^2+4} \cdot 2t - \frac{1}{2} \cdot \frac{1}{1+(t/2)^2} \cdot \frac{1}{2}$$

$$\frac{t}{2} = \frac{1}{2}t$$

$$\frac{d}{dx}[\arcsin x] = \frac{1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\arctan x] = \frac{1}{1+x^2}$$
$$\frac{d}{dx}[\operatorname{arcsec} x] = \frac{1}{|x|\sqrt{x^2-1}}$$
$$\frac{d}{dx}[\arccos x] = \frac{-1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\operatorname{arccot} x] = \frac{-1}{1+x^2}$$
$$\frac{d}{dx}[\operatorname{arccsc} x] = \frac{-1}{|x|\sqrt{x^2-1}}$$

56. $y = x \arctan 2x - \frac{1}{4}\ln(1+4x^2)$

$$y' = \left[1 \cdot \arctan 2x + x \cdot \frac{1}{1+(2x)^2} \cdot 2\right] - \frac{1}{4} \frac{1}{1+4x^2} \cdot 8x$$

$$\frac{d}{dx}[\arcsin x] = \frac{1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\arctan x] = \frac{1}{1+x^2}$$
$$\frac{d}{dx}[\operatorname{arcsec} x] = \frac{1}{|x|\sqrt{x^2-1}}$$
$$\frac{d}{dx}[\arccos x] = \frac{-1}{\sqrt{1-x^2}}$$
$$\frac{d}{dx}[\operatorname{arccot} x] = \frac{-1}{1+x^2}$$
$$\frac{d}{dx}[\operatorname{arccsc} x] = \frac{-1}{|x|\sqrt{x^2-1}}$$

5.4 – Find the second derivative

80. $f(x) = \frac{1}{x-2} = (x-2)^{-1}$

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

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