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)

$f(x) = \ln\sqrt{1+\sin^2 x}$, $\left(\frac{\pi}{4}, \ln\sqrt{\frac{3}{2}}\right)$

$f'(x) = \frac{1}{\sqrt{1+\sin^2 x}} \cdot \frac{1}{2\sqrt{1+\sin^2 x}} \cdot 2\sin x \cdot \cos x$

$f'\left(\frac{\pi}{4}\right) = m$ $\quad y - \ln\sqrt{\frac{3}{2}} = m\left(x - \frac{\pi}{4}\right)$

$Ax + By = C$

$y = mx + b$

$[0, 2\pi)$

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

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

$-2\sin x + 2\cos 2x = 0$

$-2\sin x + 2(1 - 2\sin^2 x) = 0$

$-2\sin x + 2 - 4\sin^2 x = 0$

$-2(2\sin^2 x + \sin x - 1) = 0$

$2x^2 + x - 1$

$(2\sin x - 1)(\sin x + 1) = 0$

$\sin x = \frac{1}{2}$ $\quad \sin x = -1$

$x = \frac{\pi}{6}, \frac{5\pi}{6}$ $\quad x = 3\pi/2$

$2x^2 + x - 1$

$(x + 1)(2x - 1)$

$2x^2 + x - 1$

$2x^2 + 2x - x - 1$

$2x(x+1) - 1(x+1)$

$(x+1)(2x-1)$

$$\left[2^{f(x)}\right]' = 2^{f(x)} \ln 2 \cdot f'(x)$$

$$\left[[f(x)]^2\right]' = 2f(x) \cdot f'(x)$$

$$\left[2^{[f(x)]^2}\right]' = 2^{f^2(x)} \ln 2 \cdot 2f(x) \cdot f'(x)$$

5.1

58. $f(x) = \ln \sqrt[3]{\dfrac{x-1}{x+1}} = \ln \left(\dfrac{x-1}{x+1}\right)^{1/3}$ $\log a^p = p \log a$ $\log \frac{M}{N} = \log M - \log N$

$$= \frac{1}{3} \ln \left(\frac{x-1}{x+1}\right) = \frac{1}{3}\ln(x-1) - \frac{1}{3}\ln(x+1)$$

$$f'(x) = \frac{1}{3(x-1)} \cdot 1 - \frac{1}{3(x+1)} \cdot 1$$

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

5.1

58. $f(x) = \ln \sqrt[3]{\dfrac{x-1}{x+1}} = \ln\left(\dfrac{x-1}{x+1}\right)^{1/3}$

$\log a^p = p\log a$

$\log \frac{M}{N} = \log M - \log N$

$= \frac{1}{3}\ln\left(\frac{x-1}{x+1}\right) = \frac{1}{3}\ln(x-1) - \frac{1}{3}\ln(x+1)$

$f'(x) = \boxed{\frac{1}{3(x-1)}\cdot 1 - \frac{1}{3(x+1)}\cdot 1}$

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

Find the second derivative.

82. $f(x) = \sec^2 \pi x = (\sec \pi x)^2$

$f'(x) = 2\sec\pi x \cdot \sec\pi x \tan \pi x \cdot \pi$

$= [2\pi \tan \pi x](\sec^2 \pi x)$

$f''(x) = 2\pi^2 \sec^2 \pi x \cdot \sec^2 \pi x + 2\pi \tan \pi x \cdot (2\pi \tan \pi x \sec^2 \pi x)$

$= 2\pi^2 \sec^4 \pi x + 4\pi^2 \tan^2 \pi x \sec^2 \pi x$