Math 106, Spring 2017

<p align="center">**Worksheet 1, Friday, January 26th, 2018**</p>

1. Graph the function $y = \sin x$ on the interval $[0, 2\pi]$. Answer the following:

(a) $\sin 0 =$

(b) $\sin \pi =$

(c) $\sin \dfrac{\pi}{2} =$

(d) $\sin \dfrac{3\pi}{2} =$

(e) $\sin 2\pi =$

2. Graph the function $y = \cos x$ on the interval $[0, 2\pi]$. Answer the following:

(a) $\cos 0 =$

(b) $\cos \pi =$

(c) $\cos \dfrac{\pi}{2} =$

(d) $\cos \dfrac{3\pi}{2} =$

(e) $\cos 2\pi =$

3. Compute the following trig. values. Justify by showing the work on the Unit Circle.

(a) Compute $\sin \dfrac{2\pi}{3} =$

(b) Compute $\cos \dfrac{2\pi}{3} =$

(c) Compute $\sin \dfrac{5\pi}{3} =$

(d) Compute $\cos \dfrac{5\pi}{3} =$

(e) Compute $\cos \dfrac{3\pi}{4} =$

(f) Compute $\tan \dfrac{5\pi}{6} =$

(g) Compute $\sin \dfrac{11\pi}{6} =$

FACT: The derivative of $\sin x$ is equal to $\cos x$. That is,

$$\boxed{\frac{d}{dx}\sin x = \cos x} \qquad \textbf{Memorize.}$$

FACT: The derivative of $\cos x$ is equal to $-\sin x$. That is,

$$\boxed{\frac{d}{dx}\cos x = -\sin x} \qquad \textbf{Memorize.}$$

4. For each function below, find the equation of the tangent line to the curve $f(x)$ at the given x-coordinate.

(a) $f(x) = \sin x$ at $x = 0$.

(b) $f(x) = \cos x$ at $x = \dfrac{\pi}{6}$.

(c) $f(x) = \tan x$ at $x = \dfrac{\pi}{3}$.

5. Use the above facts and differentiaton rules to show that

$$\boxed{\frac{d}{dx}\tan x = \sec^2 x} \qquad \textbf{Memorize.}$$

6. Use the above facts and differentiaton rules to show that

$$\boxed{\frac{d}{dx}\sec x = \sec x \tan x} \qquad \textbf{Memorize.}$$

Practice:

$$\frac{d}{dx}\sin(2x) = \cos(2x)2$$

$$\frac{d}{dx}\sin^2 x = \frac{d}{dx}(\sin x)^2 = 2\sin x(\cos x)$$

$$\frac{d}{dx}\sin^2(3x) = \frac{d}{dx}(\sin(3x)^2 = 2\sin(3x)(\cos(3x))3$$

7. Let $W(x) = \cos^2(2x) + \tan(2x) + 3\sec x$. Compute $W'\left(\dfrac{\pi}{6}\right)$. Simplify your answer completely.

$$\boxed{\textbf{Turn in your own solutions.}}$$