Name:_____

**MA 2310: Worksheet 1**

The first thing we will need to do is figure out the last two derivative formulas for our sheet: $\sec x$ and $\csc x$ So complete the following problems and fill in the chart on the last page.

1. Find the derivative of $f(x) = sec(x)$. Recall $sec(x) = \frac{1}{\cos(x)}$. Simplify and put your answer in the chart on the last page. Hint your answer should be $f'(x) = \sec(x)\tan(x)$.
2. Find the derivative of $f(x) = sec(x)$. I forget what $\csc(x)$ is. You will need this to help you finish this problem. Again simplify and put your answer in the chart on the last page. Hint your answer should be $f'(x) = -\csc(x)\cot(x)$.

Now we can practice computing many derivatives.

1. Find the third derivative of $f(x) = x^4 - 6x - 1$. That is find $f'''(x)$.
2. Compute $\frac{d^3y}{dx^3}$ for $y = \frac{1}{1-x}$.

Compute $f'(x)$ for the following functions.

1. $f(x) = 4e^{3x}$
2. $f(x) = 4e^{3x^2}$
3. $f(x) = 4xe^{x}$
4. $f(x) = 4xe^{3x}$
5. $f(x) = 4xe^{3x^2}$

Now let's compute some derivatives for some trigonometric functions. Use the derivatives you found for $\sec x$ and $\csc x$. Compute the derivatives for the following functions.

1. $f(x) = \sin(x)$
2. $f(x) = \sin(3x)$
3. $f(x) = \sin(3x^2)$
4. $f(x) = \sin(e^{3x^2})$
5. $f(x) = \tan(x)$
6. $f(x) = \tan(3x)$
7. $f(x) = \tan(3x^2)$
8. $f(x) = \tan(e^{3x^2})$
9. $f(x) = \sec(x)$

10. $f(x) = \sec(3x)$
11. $f(x) = \sec(3x^2)$
12. $f(x) = \sec(e^{3x^2})$
13. $f(x) = \tan(x)\cot(x)$
14. $f(x) = \tan(x^2)$
15. $f(x) = \tan(x^2)\cot(3x)$
16. $f(x) = \tan^2(x)$
17. $f(x) = \sin(4x)\cos(2x)$

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**Formulae**

0. $\dfrac{d}{dx}\left[k\right] = 0$
1. $\dfrac{d}{dx}\left[x^n\right] = nx^{n-1}$
2. $\dfrac{d}{dx}\left[e^x\right] = e^x$
3. $\dfrac{d}{dx}\left[\ln x\right] = \dfrac{1}{x}$
4. $\dfrac{d}{dx}\left[\sin x\right] = \cos x$
5. $\dfrac{d}{dx}\left[\cos x\right] = -\sin x$
6. $\dfrac{d}{dx}\left[\tan x\right] = \sec^2 x$
7. $\dfrac{d}{dx}\left[\cot x\right] = -\csc^2 x$
8. $\dfrac{d}{dx}\left[\sec x\right] =$
9. $\dfrac{d}{dx}\left[\csc x\right] =$

**The Power Rule**

$$\frac{d}{dx}\left[(f(x))^n\right] = n(f(x))^{n-1}$$

**The Product Rule**

$$\frac{d}{dx}\left[FS\right] = F'S + FS'$$

**The Quotient Rule**

$$\frac{d}{dx}\left[\frac{N}{D}\right] = \frac{N'D - ND'}{D^2}$$

**The Chain Rule**

$$\frac{d}{dx}\left[f(g(x))\right] = f'(g(x))g'(x)$$