

## Derivatives of Trigonometric Functions- HW Problems

Evaluate the following limits.

1.  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{2x}$

2.  $\lim_{x \rightarrow 0} \frac{\sin(6x)}{\sin(2x)}$

3.  $\lim_{x \rightarrow 0} \frac{\tan(4x)}{\sin(6x)}$

4.  $\lim_{x \rightarrow 0} \frac{\sin(2x)}{2x^2 - 4x}$

5.  $\lim_{x \rightarrow 0} \frac{(\cos^2 x)(\tan^2 x)}{6x^2}$

Find the derivatives of the following functions.

6.  $f(x) = \sin x - 4\cos x + 3\tan x$

7.  $f(x) = x\cos x - \frac{\sin x}{x^2}$

8.  $g(x) = \cos^2 x = (\cos(x))(\cos(x))$

9.  $f(t) = t\csc(t) - \frac{\tan(t)}{t^2}$

10.  $g(t) = (\sec(t))(\cot(t))$

11.  $f(\theta) = \frac{\sin(\theta)}{1+\cos(\theta)}$

12.  $g(x) = \frac{x\cos(x)}{1+x}$

13.  $f(x) = 2\sec(x) - x^2 \cot(x)$

14.  $f(x) = \sin(x)$ , find  $f^{23}(x)$  and  $f^{23}\left(\frac{\pi}{6}\right)$ .

15. At what values of  $x$  does the graph of  $f(x) = 2 - 4 \sin(x)$  have a horizontal tangent line?