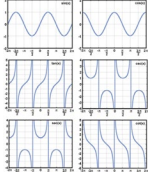# Tangent Lines for Trig Functions

Derivatives of the six basic trig functions are used often and must be memorized. Remember, though, if your memory fails you --- or the derivatives seem too similar or overwhelming --- you can *derive* many of the formulas you will need. How can we use what we already know to find these new derivatives?

1. Use your knowledge of derivatives to complete the table below. Be sure to confirm your results by comparing your manual calculation at with the numerical derivative on your calculator.

Rewrite of original function	Required work to develop the derivative formula	Simplified derivative formula
$f(\theta) = \sin\theta$		
$g(\theta) = \cos\theta$		
$h(\theta) = \tan\theta$ $= \dfrac{\boxed{}}{\boxed{}}$		
$k(\theta) = \cot\theta = \dfrac{\boxed{}}{\boxed{}}$	+0.1 Rhino Participation Bonus due Thursday, 2/15 (On separate paper please)	$k'(\theta) = -\csc^2\theta$
$m(\theta) = \sec\theta = \dfrac{\boxed{}}{\boxed{}}$	+0.1 Rhino Participation Bonus due Thursday, 2/15 (On separate paper please)	$m'(\theta) = \sec\theta\tan\theta$
$p(\theta) = \csc\theta = \dfrac{\boxed{}}{\boxed{}}$	+0.1 Rhino Participation Bonus due Thursday, 2/15 (On separate paper please)	$p'(\theta) = -\csc\theta\cot\theta$

2. What feature do the derivatives of $\cos\theta$, $\cot\theta$, and $\csc\theta$ share that might be helpful when you're memorizing these derivatives? Compare to $\sin\theta$, $\tan\theta$, and $\sec\theta$ respectively by completing the blanks on the opposite page.

Derivatives of Trig Functions

Important Ideas:

The derivative of the sine is _____ and the derivative of the co**sine** is _____

The derivative of the tangent is _____ and the derivative of the co**tangent** is _____

The derivative of the secant is _____ and the derivative of the co**secant** is _____

Check Your Understanding!

In 1 – 5: find the derivative of each function.

1. $f(\theta) = \csc\theta + \sec\theta$

2. $W(t) = \dfrac{1}{\sec t} - \dfrac{2}{3\csc t}$

3. $F(y) = \dfrac{\sin y}{\tan y \cdot \csc y}$

4. $P(x) = \cos x \cdot \tan x$

5. $g(\alpha) = \cot \alpha \cdot \cot \alpha$

6. Find $H'\left(\dfrac{\pi}{3}\right)$ when $H(x) = \cos x \cdot \tan x + \dfrac{\sin x + \tan x}{\sin x}$