

Write your questions
and thoughts here!

Trig Derivatives

$$\frac{d}{dx} \sin x =$$

$$\frac{d}{dx} \tan x =$$

$$\frac{d}{dx} \sec x =$$

$$\frac{d}{dx} \cos x =$$

$$\frac{d}{dx} \cot x =$$

$$\frac{d}{dx} \csc x =$$

Common struggles for students dealing with trig derivatives:

- Memorizing.
- Unit Circle values.
- Simplifying/manipulating trig expressions.
- Trig reciprocals in a calculator.

1. Find the derivative of $y = \sin x \tan x$

2. Find $f' \left(\frac{\pi}{6} \right)$ if $f(x) = \frac{x}{\sec x}$

3. Estimate the derivative with a calculator of $g(x) = \csc^2 4x$ at $x = 2$

2.10 Derivatives of $\tan x$, $\cot x$, $\sec x$, and $\csc x$

Practice

Calculus

Find the derivative of each function.

1. $y = 5 - \csc x$

2. $h(x) = 2x \tan(x)$

3. $r = \frac{\sin \theta}{\theta}$

4. $g(x) = \frac{\cot x}{x}$

5. $f(x) = \frac{1}{2 \cos x}$

6. $y = 5x \sec x$

Find the derivative at the given x -value. Show your work!

7. $f(x) = 3 \tan x$ at $x = \frac{2\pi}{3}$.

8. $f(x) = 2 \sec x$ at $x = \frac{\pi}{4}$.

9. $f(x) = x \cot x$ at $x = \frac{\pi}{6}$.

Estimate the derivative at the given x -value by using a calculator.

10. $f(x) = \sin^2\left(\frac{x}{5}\right)$ at $x = 1.8$.

11. $f(x) = \frac{\cot(x^2)}{2}$ at $x = -1$.

12. $f(x) = 3 \sec(e^x)$ at $x = 2.5$.

Find the equations of both the normal line and the tangent line.

13. $y = \sec x$ at $x = \pi$

Tangent: _____

Normal: _____

14. $y = \tan x$ at $x = \frac{\pi}{3}$

Tangent: _____

Normal: _____

2.10 Derivatives of $\tan x$, $\cot x$, $\sec x$, and $\csc x$

Test Prep

Evaluate each limit.

15. $\lim_{h \rightarrow 0} \frac{\tan\left(\frac{\pi}{3}+h\right) - \tan\left(\frac{\pi}{3}\right)}{h} =$

16. $\lim_{h \rightarrow 0} \frac{\sec\left(\frac{\pi}{6}+h\right) - \sec\left(\frac{\pi}{6}\right)}{h} =$