



Activity 6.3^{†‡} – Other Trigonometric Functions

FOR DISCUSSION: Define each of the six trig functions as a ratio of sides in a right triangle.
State the derivative formula for each of the six trig functions.

1. Express each trigonometric function below in terms of sine and cosine.

(a) $\tan x =$

(b) $\sec x =$

(c) $\cot x =$

(d) $\csc x =$

2. Write down each derivative from memory.

(a) $\frac{d}{dx}(\tan x) =$

(b) $\frac{d}{dx}(\sec x) =$

(c) $\frac{d}{dx}(\cot x) =$

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

[†] This activity is referenced in Lesson 6.3.

[‡] This activity has supplemental exercises.

3. Compute each derivative

(a) $\frac{d}{dx}(e^{\sec x}) =$

(b) $\frac{d}{dt}(\tan(\ln t)) =$

(c) $\frac{d}{d\theta}(\theta \cot(2\theta)) =$

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

4. Write down each indefinite integral from memory.

(a) $\int \sec x \tan x \, dx =$

(b) $\int \sec^2 x \, dx =$

(c) $\int \csc^2 x \, dx =$

(d) $\int \csc x \cot x \, dx =$

5. Evaluate each indefinite integral.

(a) $\int \sec^2(3x + 2) \, dx =$

(**HINT**: Use a u -sub or the short cut.)

(b) $\int \frac{x^2 \sin x - x}{x^2} \, dx =$

(**HINT**: Split up the integrand.)

6. Evaluate the limit.

$$\lim_{\theta \rightarrow 0} \frac{7 \sin \theta}{4 \tan \theta + \theta} =$$

7. Verify each derivative rule given in this lesson by first rewriting the trig function in terms of sine and cosine. Justify why your answers may look different than those from the lesson.

$$(a) \frac{d}{dx}(\tan x) = \frac{d}{dx}\left(\frac{\sin x}{\cos x}\right) =$$

$$(b) \frac{d}{dx}(\cot x) = \frac{d}{dx}\left(\frac{\cos x}{\sin x}\right) =$$

$$(c) \frac{d}{dx}(\sec x) =$$

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