Section 5.4 Learning Objectives:

- Video 1: Definitions and Relationships (7:54)
  - State the definitions of the other trigonometric functions using points on the plane.
  - State the relationships between the other trigonometric functions and the sine and cosine functions.
  - Determine the values of trigonometric functions given an angle on the unit circle diagram.
- Video 2: The Other Pythagorean Identities (2:53)
  - State the two alternative forms of the Pythagorean identity.
  - Understand the derivation of the alternative forms of the Pythagorean identity.
- Video 3: Algebra and Geometry (8:45)
  - Determine the values of trigonometric functions using algebra.
  - Determine the values of trigonometric functions using geometry.
- Video 4: Proving Trigonometric Identities (8:33)
  - Prove trigonometric identities using the Pythagorean identities and the relationships between the trigonometric functions.

Individual Learning Objective Binder Check: Before class, you should have completed the Learning Objective Worksheet for each of the learning objectives in the video. These should have been placed in a binder in an organized manner so that it can be quickly checked by the instructor. If you have specific questions, this is a good time to ask the professor about them. While you are waiting for the professor to make their way around the room, you can work on the rest of the activities.

Group Practice Problems: In a group of no more than 3 students, work on the following problems. While everyone in the group should work together, each student should write out their work for themselves. This work can prove to be helpful when working on the homework assignment. If questions arise as you're working on these problems, feel free to seek help from the instructor or other groups of students.

Group Practice Problems #1 - The Values of the Other Trigonometric Functions: For each angle θ, determine $\tan(\theta)$, $\cot(\theta)$, $\sec(\theta)$, and $\csc(\theta)$.

- $\theta = 30^\circ$
- $\theta = \frac{3\pi}{4}$
- $\theta = 225^\circ$
- $\theta = \frac{7\pi}{6}$

Group Practice Problems #2 - Determining the Values of Trigonometric Functions with Algebra: Use algebraic techniques to solve the following problems.

- Suppose that $\sec(\theta) = \frac{7}{3}$ and that $\frac{3\pi}{2} < \theta < 2\pi$. Determine $\cot(\theta)$.
- Suppose that $\tan(\theta) = 4$ and that $\pi < \theta < \frac{3\pi}{2}$. Determine $\csc(\theta)$.

Group Practice Problems #3 - Determining the Values of Trigonometric Functions with Geometry: Use geometric techniques to solve the following problems.

- Suppose that $\csc(\theta) = -\frac{9}{5}$ and that $\pi < \theta < \frac{3\pi}{2}$. Determine $\cot(\theta)$.
- Suppose that $\cot(\theta) = \frac{4}{3}$ and that $0 < \theta < \frac{\pi}{2}$. Determine $\sec(\theta)$.

Group Practice Problems #4 - Simplifying Expressions: Rewrite the expression as an expression involving a single trigonometric function.

- $\cos(t)\csc(t)$
- $\frac{\tan(t)}{\sec(t)-\cos(t)}$

Group Practice Problems #5 - Proving Identities: Prove the following mathematical identities.

- $1 + \cot(x) = \cos(x)\left(\sec(x) + \csc(x)\right)$
- $\frac{(1+\cos(\alpha))(1-\cos(\alpha))}{\sin(\alpha)} = \sin(\alpha)$
- $\frac{\sin^4(t)-\cos^4(t)}{\sin(t)-\cos(t)} = \sin(t) + \cos(t)$

Group Work Check: Present your work for the practice problems to the instructor for approval. The work will not be graded deeply, but simply graded on whether it appears that you have put in a good faith effort to do the work. If you are not confident about particular problems, this is a good time to ask about them.

Section 5.4 Homework:

- 5.4 (General Problems): #1, 5, 9, 11, 15, 19, 23, 27, 31
- 5.4 (Write-Up): #30, 33