

Chapter 5 Analytic Trigonometry

Section 5.1 Using Fundamental Identities

Objective: In this lesson you learned how to use fundamental trigonometric identities to evaluate trigonometric functions and simplify trigonometric expressions.

Course Number

Instructor

Date

I. Introduction (Page 372)

Name four ways in which the fundamental trigonometric identities can be used:

- 1) to evaluate trigonometric functions
- 2) to simplify trigonometric expressions
- 3) to develop additional trigonometric identities
- 4) to solve trigonometric equations

What you should learn

How to recognize and write the fundamental trigonometric identities

The Fundamental Trigonometric Identities

List six reciprocal identities:

- 1) $\sin u = 1/(\csc u)$
- 2) $\cos u = 1/(\sec u)$
- 3) $\tan u = 1/(\cot u)$
- 4) $\csc u = 1/(\sin u)$
- 5) $\sec u = 1/(\cos u)$
- 6) $\cot u = 1/(\tan u)$

List two quotient identities:

- 1) $\tan u = (\sin u)/(\cos u)$
- 2) $\cot u = (\cos u)/(\sin u)$

List three Pythagorean identities:

- 1) $\sin^2 u + \cos^2 u = 1$
- 2) $1 + \tan^2 u = \sec^2 u$
- 3) $1 + \cot^2 u = \csc^2 u$

List six cofunction identities:

- 1) $\sin(\pi/2 - u) = \cos u$
- 2) $\cos(\pi/2 - u) = \sin u$
- 3) $\tan(\pi/2 - u) = \cot u$
- 4) $\cot(\pi/2 - u) = \tan u$
- 5) $\sec(\pi/2 - u) = \csc u$
- 6) $\csc(\pi/2 - u) = \sec u$

List six even/odd identities:

- 1) $\sin(-u) = -\sin u$
- 2) $\cos(-u) = \cos u$
- 3) $\tan(-u) = -\tan u$
- 4) $\csc(-u) = -\csc u$
- 5) $\sec(-u) = \sec u$
- 6) $\cot(-u) = -\cot u$

II. Using the Fundamental Identities (Pages 373–376)

Example 1: Explain how to use the fundamental trigonometric identities to find the value of $\tan u$ given that $\sec u = 2$.

Use the Pythagorean identity $1 + \tan^2 u = \sec^2 u$. Substitute 2 for the value of $\sec u$ and solve for $\tan u$.

What you should learn

How to use the fundamental trigonometric identities to evaluate trigonometric functions, simplify trigonometric expressions, and rewrite trigonometric expressions

Example 2: Explain how to use the fundamental trigonometric identities to simplify $\sec x - \tan x \sin x$.

Rewrite the expression in terms of sines and cosines. Combine the resulting fractions to obtain $(1 - \sin^2 x)/(\cos x)$. Using the Pythagorean identity $\sin^2 u + \cos^2 u = 1$, replace the numerator with $\cos^2 x$. Simplify the result to obtain $\cos x$.

Additional notes**Homework Assignment**

Page(s)

Exercises