

MATH 125

Numerical Trigonometry

Course Objectives

Unit 1: Introduction to Trigonometric Functions

1.1 Review Right Triangles

1.1.1 Solve problems using the Pythagorean Theorem.

1.1.2 Solve problems using 45-45-90 right triangles.

1.1.3 Solve problems using 30-60-90 right triangles.

1.2 Compute with Basic Trigonometric Functions

1.2.1 Determine basic trigonometric function values for right triangles.

1.2.2 Determine basic trigonometric function values for special right triangles.

1.3 Solve Simple Triangles

1.3.1 Use basic trigonometric functions to solve right triangle problems.

1.3.2 Use inverses to solve right triangle problems.

1.4 Work with Reference Angles

1.4.1 Determine basic trigonometric function values using reference angles.

1.4.2 Determine trigonometric function values using reference angles.

1.5 Solve Trigonometric Applications

1.5.1 Solve angle of elevation problems.

1.5.2 Solve angle of depression problems.

1.5.3 Solve other applications.

Unit 2: Law of Sines and Law of Cosines

2.1 Derive and Identify the Law of Sines and the Law of Cosines

2.1.1 Derive and identify the Law of Sines.

2.1.2 Derive and identify the Law of Cosines.

2.2 Apply the Law of Sines I: Two Angles

2.2.1 Solve triangles given two angles (AAS).

2.2.2 Solve triangles given two angles (ASA).

2.3 Apply the Law of Sines II: Two Sides: The Ambiguous Case

2.3.1 Solve the ambiguous case with two solutions.

2.3.2 Solve the ambiguous case with one solution.

2.3.3 Solve the ambiguous case with no solution.

2.4 Apply the Law of Cosines

2.4.1 Solve for a missing side.

2.4.2 Solve for a missing angle.

2.5 Solve triangles

2.5.1 Solve applications with Law of Sines.

2.5.2 Solve applications with Law of Cosines.

Unit 3: Unit Circle and Radian Measure

3.1 Construct the unit circle

3.1.1 Convert basic angles to radians.

- 3.1.2 Convert angles.
- 3.2 Label points on the unit circle
 - 3.2.1 Identify points on the unit circle.
 - 3.2.2 Determine sine and cosine values from the unit circle.
- 3.3 Compute with radian measure
 - 3.3.1 Given an angle in radians compute trigonometric function values.
 - 3.3.2 Given a trigonometric value determine the angles in radians and degrees.
- 3.4 Applications
 - 3.4.1 Compute arc length.
 - 3.4.2 Compute area of a sector.
- 3.5 Graph basic trigonometric functions
 - 3.5.1 Graph sine and cosine.
 - 3.5.2 Graph tangent.

Unit 4: Periodic Functions and Applications

- 4.1 Translate $y = \sin x$ and $y = \cos x$
 - 4.1.1 Graph and identify vertical shifts of $y = \sin x$ and $y = \cos x$.
 - 4.1.2 Graph and identify horizontal shifts of $y = \sin x$ and $y = \cos x$.
 - 4.1.3 Graph and identify translations of $y = \sin x$ and $y = \cos x$.
- 4.2 Transform $y = \sin x$ and $y = \cos x$
 - 4.2.1 Graph and identify amplitude transformations of the form $y = a \sin x$ and $y = a \cos x$.
 - 4.2.2 Graph and identify period transformations of the form $y = a \sin bx$ and $y = a \cos bx$.
- 4.3 Combine Transformations
 - 4.3.1 Graph and identify transformations of the form $y = a \sin b(x - h) + k$.
 - 4.3.2 Graph and identify transformations of the form $y = a \cos b(x - h) + k$.
- 4.4 Graph and identify graphs of other trigonometric functions
 - 4.4.1 Graph and identify transformations of $y = \tan x$.
 - 4.4.2 Graph and identify graphs of $y = \sec x$, $y = \csc x$, and $y = \cot x$.
- 4.5 Model real world situations with periodic functions
 - 4.5.1 Identify a periodic function for a data set.
 - 4.5.2 Solve problems using periodic functions.
 - 4.5.3 Use periodic regression to model situations.