

Exam 3 Review

Research has shown that students who develop their own study guides for exam preparation do better on their exams than students who use a study guide that has been developed for them. Thus, this is simply a topic list of the content we have covered in preparation for Exam 3. Hopefully you can use this topic list as a tool for developing your own study guide.

In addition to the topic list for Exam 3, please find the list of trigonometric identities that we expect you will **memorize** as they will NOT be provided on the exam. Any identities not included on this list will be provided on Exam 3 if needed.

Also, **memorize** the side lengths of the special triangles we have studied (see concept list for section 6.1) and how to use them with the unit circle in order to evaluate the six trigonometric functions exactly at each of the special angles.

Concepts:

- Properties of Logarithms
- Simplifying Logarithmic Expressions
- Proving the Product Rule for Logarithms
- Using the Change of Base Formula to Find Approximate Values of Logarithms

(Section 5.4)

Concepts:

- Solving Exponential and Logarithmic Equations Algebraically
 - Strategies:
 - * Same base exponential expressions that are equal must have equal exponents.
 - * Same base logarithmic expressions that are equal must have equal arguments.
 - * Isolate exponential expression, rewrite equation in logarithmic form.
 - * Isolate logarithmic expression, rewrite equation in exponential form.

(Section 5.5)

Concepts:

- Determining whether an exponential model is appropriate
- Develop appropriate models for applications involving exponential and logarithmic models

(Section 5.6)

Concepts:

- Angles
 - Initial Side and Terminal Side
 - Standard Position
 - Coterminal Angles
- Measuring Angles
 - Radian Measure vs. Degree Measure
 - Radian Measure as a Distance on the Unit Circle
 - Converting between Radian Measure and Degree Measure
 - Finding the Quadrant Associated with the Terminal Side of an Angle
- The $\frac{\pi}{4} - \frac{\pi}{4} - \frac{\pi}{2}$ or the $45^\circ - 45^\circ - 90^\circ$ Triangle - **MEMORIZE!**
- The $\frac{\pi}{6} - \frac{\pi}{3} - \frac{\pi}{2}$ or the $30^\circ - 60^\circ - 90^\circ$ Triangle - **MEMORIZE!**
- Identifying the Point on the Unit Circle that Corresponds to an Angle in Standard Position

(Section 6.1)

Concepts:

- The Basic Trigonometric Functions
 - The Definitions of sin, cos, and tan Based on the Unit Circle
 - Evaluating the Basic Trigonometric Functions at Special Angles
 - The Sign of a Trigonometric Function
- Approximating Values of Trigonometric Functions with Your Calculator
 - Parentheses Are Important
 - Radian Mode vs. Degree Mode
- Understanding Trigonometric Notation

(Section 6.2)

Concepts:

- The Graph of the sin, cos, and tan Functions
- Applying Graph Transformations to the Graphs of the sin, cos, and tan Functions
- Using Graphical Evidence to Make Conjectures about Identities

(Section 6.4)

Concepts:

- Explore Horizontal Transformations to the graphs of $f(t) = \sin(bt)$ and $g(t) = \cos(bt)$
- Explore Vertical Transformations to the graphs of $f(t) = A \sin(bt)$ and $g(t) = A \cos(bt)$
- Identify the Period, Amplitude, and Phase Shift of:

$$f(t) = A \sin(bt + c)$$

and

$$g(t) = A \cos(bt + c)$$

(Section 6.5)

Concepts:

- The Other Trigonometric Functions
 - The Definitions of csc, sec, and cot Based on the Unit Circle
 - Evaluating csc, sec, and cot at Special Angles
 - The Graphs of csc, sec, and cot
- Trigonometric Identities
 - Pythagorean Identities
 - Periodicity Identities
 - Negative Angle Identities

(Section 6.6)

Concepts:

- Expressions vs. Identities
- Simplifying Trigonometric Expressions
- Proving Trigonometric Identities
- Disproving Trigonometric Identities

(Section 7.1)

Concepts:

- The Addition and Subtraction Identities for Sine and Cosine
- The Addition and Subtraction Identities for Tangent
- The Cofunction Identities
- Identities You Should Know At This Point

(Section 7.2)

Concepts:

- The Double-Angle Identities
- The Power-Reducing Identities
- The Half-Angle Identities
- The Sum/Product Identities

(Section 7.3)

MEMORIZE!

Function Definition Identities

- $\tan(x) = \frac{\sin(x)}{\cos(x)}$
- $\cot(x) = \frac{\cos(x)}{\sin(x)}$
- $\csc(x) = \frac{1}{\sin(x)}$
- $\sec(x) = \frac{1}{\cos(x)}$

Pythagorean Identities

- $\sin^2(x) + \cos^2(x) = 1$
- $\tan^2(x) + 1 = \sec^2(x)$
- $1 + \cot^2(x) = \csc^2(x)$
- $\cos^2(x) = 1 - \sin^2(x)$
- $\tan^2(x) = \sec^2(x) - 1$
- $\cot^2(x) = \csc^2(x) - 1$
- $\sin^2(x) = 1 - \cos^2(x)$
- $1 = \sec^2(x) - \tan^2(x)$
- $1 = \csc^2(x) - \cot^2(x)$

Negative Angle Identities

- $\sin(-x) = -\sin(x)$.
- $\cos(-x) = \cos(x)$.
- $\tan(-x) = -\tan(x)$.
- $\csc(-x) = -\csc(x)$.
- $\sec(-x) = \sec(x)$.
- $\cot(-x) = -\cot(x)$.

Periodicity Identities are true for any integer n .

- $\sin(x + 2\pi n) = \sin(x)$.
- $\cos(x + 2\pi n) = \cos(x)$.
- $\tan(x + \pi n) = \tan(x)$.
- $\csc(x + 2\pi n) = \csc(x)$.
- $\sec(x + 2\pi n) = \sec(x)$.
- $\cot(x + \pi n) = \cot(x)$.