Math 229: Review for Test 1

Bring your scientific calculator to the exam. (Graphing calculators are not allowed on the test.)

Suggested Review for Test 1

Read and study: Study Chapter 7 Review, pages 633 - 636	**Do**: Practice Test, page 639: 1 – 23 all **Even Answers** on last page of review sheet.

General
- Know the difference between an *exact* value and an *approximation* (e.g., $\sqrt{2}$ is EXACT, whereas 1.4142 is an approximation of $\sqrt{2}$)

Concepts to study:
Note: For all of these concepts, you should be able to sketch a graph or diagram according to the description. Many of the problems on the test will require a sketch as part of the answer. (to receive full credit on the problem)

Angles (Section 7.1)
- Identify the initial side and terminal side of an angle.
- Graph angles on the xy-coordinate system. This means you should know…
    - Standard position of an angle
    - Positive vs. negative angles
- Find one or more Coterminal Angles for a given angle in standard position.
- Convert angles from degrees to radians and vice versa.
- Know (memorize!) the degree measurement of specific radian angles

    Know what the following angles are in degrees, without having to convert:

$$0,\frac{\pi}{2},\pi,\frac{3\pi}{2},2\pi \qquad \frac{\pi}{3},\frac{\pi}{4},\frac{\pi}{6}$$
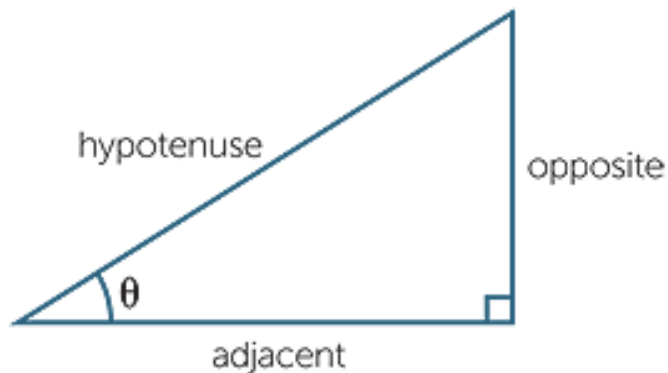
Applications
- Linear and Angular Speed
- Arclength (remember that the angle MUST be in radians!)
- Area of a Sector (remember that the angle MUST be in radians!)

Triangles (Section 7.2)
- Memorize the sides of the basic 30-60-90 triangles
- Memorize the sides of the basic 45-45-90 triangle

Trig Definitions, Right Triangle (Section 7.2)
- Know the definition of each of the six trigonometric functions, in terms of a right triangle.
SOH-CAH-TOA is a good mnemonic to remember the first three.

- Know the Reciprocal Identities for secant, cosecant, and cotangent

- Evaluate (find the value of) any of the six trig functions for a given right angle. You might have to use the Pythagorean Theorem to find a missing side.

- Use your calculator to evaluate any of the six trig functions for a given angle.
    - You can find $\sin\theta$, $\cos\theta$, and $\tan\theta$ directly on the calculator.

    - You will have to use the Reciprocal Identities to find $\csc\theta$, $\sec\theta$, and $\cot\theta$ when using a calculator.

- **Identities to memorize!**

Reciprocal Identities	Ratio Identities
$\sec x = \dfrac{1}{\cos x} \qquad \csc x = \dfrac{1}{\sin x} \qquad \cot x = \dfrac{1}{\tan x}$	$\tan x = \dfrac{\sin x}{\cos x} \qquad\qquad \cot x = \dfrac{\cos x}{\sin x}$

Applications

- Find all missing sides of a given triangle.
  - Apply Right Triangle Trig Definitions (Ratios)
  - Apply the Pythagorean Theorem
- Identify and/or Sketch the Angle of Elevation and/or Angle of Depression. Solve problems based on these.

The xy-coordinate Trig Definitions and the Unit Circle Definitions (Sections 7.3 and 7.4)

Coordinate Definitions:

|	
- Know the xy-Coordinate Definition of all 6 trig functions $\sin\theta = \dfrac{y}{r} \qquad \csc\theta = \dfrac{r}{y}$ $\cos\theta = \dfrac{x}{r} \qquad \sec\theta = \dfrac{r}{x}$ $\tan\theta = \dfrac{y}{x} \qquad \cot\theta = \dfrac{x}{y}$	
- Know the signs of all 6 trig functions in each of the 4 quadrants. "All Students Take Calculus"	 **Sine signs Cosine signs Tangent and Cotangent signs**
- Use Reference Angles to evaluate Trig Functions for any angle. Find the Reference Angle of a given angle. Remember the Bow Tie for the reference angles!	

Unit Circle Definitions:

- Know the Unit Circle Definition for sine and cosine (see below)

- Given a Unit Circle with points labeled on it, be able too find trig function values by identifying the x-value with cos(t) or the y-value with sin(t).

General Circular Functions: Consider a point (x, y) on a circle of radius r, centered at the origin.

We know $\dfrac{x}{r} = \cos\theta$ so $x = r\cos\theta$
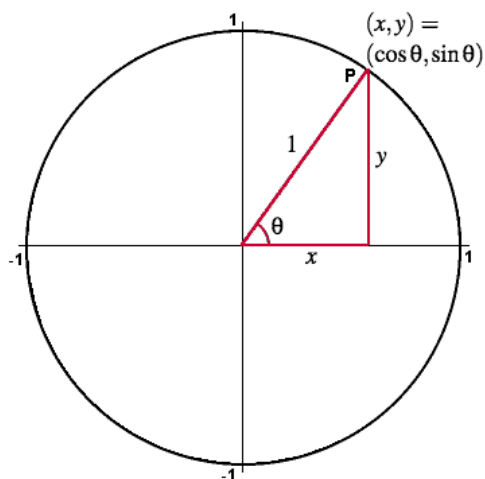
And $\dfrac{y}{r} = \sin\theta$ so $y = r\sin\theta$
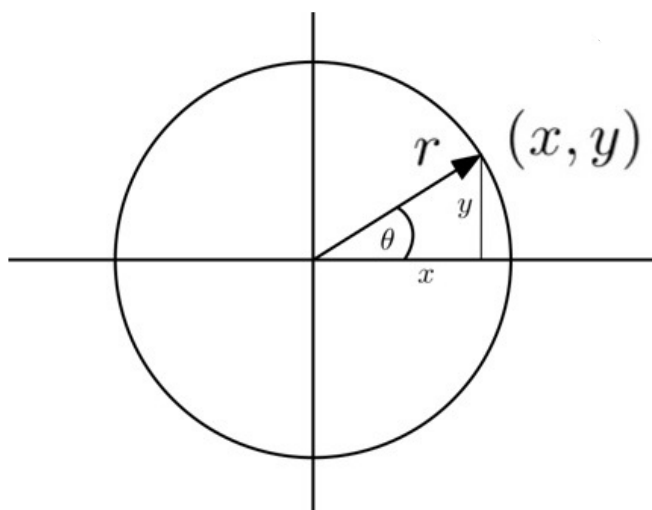
(We'll revisit this in Chapter 10!)

Unit Circle Trig Definitions: If r = 1, the Circular Function definitions become:

$$x = \cos\theta \qquad y = \sin\theta$$

$(x,y) = (\cos\theta, \sin\theta)$

The other 4 Trig Functions follow along. Again, these are consistent with the Right Triangle and the Coordinate System Definitions.

$$\tan\theta = \frac{y}{x} = \frac{\sin\theta}{\cos\theta} \qquad\qquad \cot\theta = \frac{x}{y} = \frac{\cos\theta}{\sin\theta}$$

$$\sec\theta = \frac{1}{x} = \frac{1}{\cos\theta} \qquad\qquad \csc\theta = \frac{1}{y} = \frac{1}{\sin\theta}$$
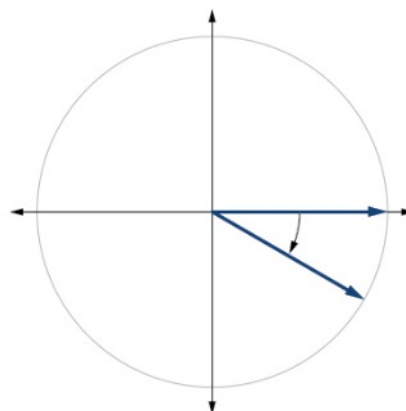
Chapter 7 Practice Test Answers

#2: $-620^\circ = -\dfrac{31\pi}{9}$ #4: 125.664 ft² #6: $\dfrac{10\pi}{7}$

#8: Draw the angle $-\dfrac{\pi}{6}$ in standard position on the Cartesian plane.

#10: $a = 3\sqrt{7},\ b = 9$

#12: Height = 316.8 ft

#14 $\sin 240^\circ = -\dfrac{\sqrt{3}}{2}$

#16: State the range of the sine and cosine functions. Range = $\left[-1,\ 1\right]$

#18: $\tan \dfrac{\pi}{3} = \sqrt{3}$

#20: $\tan 210^\circ = \dfrac{1}{\sqrt{3}}$

#22: If $\cos t = \dfrac{\sqrt{3}}{2}$, then $\cos(t - 2\pi) = \dfrac{\sqrt{3}}{2}$