

Review: Applications of right triangles

A lightning detector at point Q is situated 15 miles west of a central fire station at point R. The bearing from Q to where lightning hits due south of R is S60°E. How far is the hit from point R?

$\tan 60^\circ = \frac{15}{x}$
 $x = \frac{15}{\tan 60^\circ} = \frac{15}{\sqrt{3}} \text{ mi}$
 $= \frac{15}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}} = \frac{15\sqrt{3}}{3} = 5\sqrt{3} \text{ mi}$

Review:

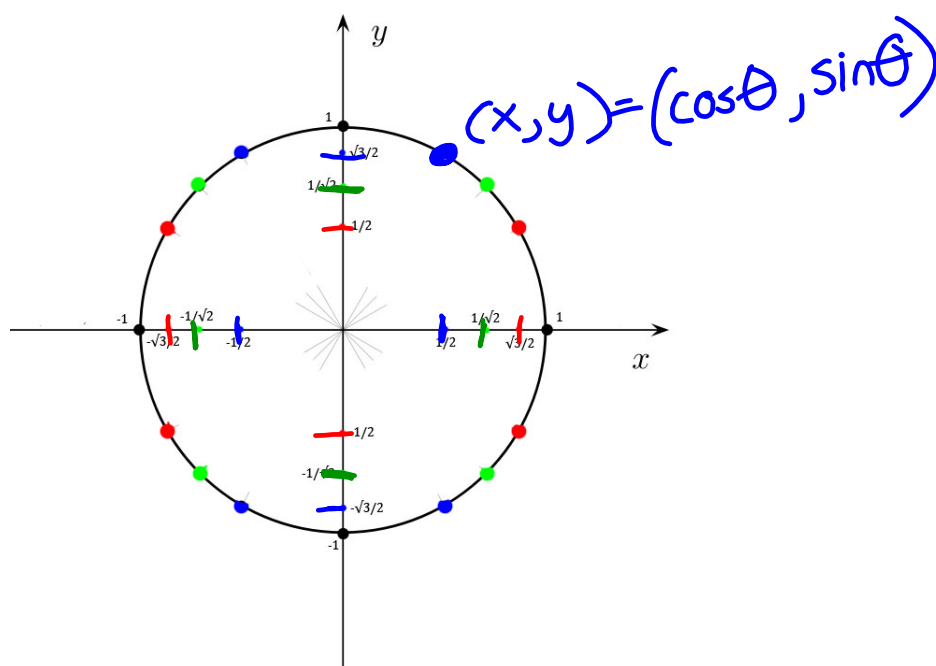
Evaluate the following:

1. $\sin 135^\circ = \frac{1}{\sqrt{2}}$
2. $\tan \frac{11\pi}{6} = -\frac{1}{\sqrt{3}}$
3. $\csc \frac{5\pi}{4} = -\sqrt{2}$
4. $\cot(-450^\circ) = 0$
5. $\cos \frac{2\pi}{3} = -\frac{1}{2}$
6. $\cos 53\pi = -1$

$\cot \theta = \frac{\cos}{\sin} = \frac{0}{1} = 0$

5.5 Circular Functions

Reflections on the Unit Circle



Even/Odd Functions

A function f is even if

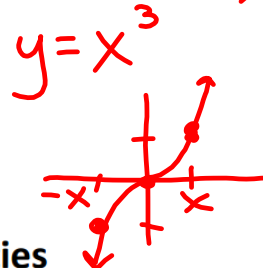
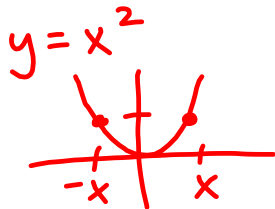
$$f(-x) = f(x)$$

Even functions are symmetric with respect to the y-axis

A function f is odd if

$$f(-x) = -f(x)$$

Odd functions are symmetric with respect to the origin



Odd-Even Identities

even *odd*

$$\cos(-x) = \cos x, \quad \sin(-x) = -\sin x, \quad \tan(-x) = -\tan x$$

$$\sec(-x) = \sec x, \quad \csc(-x) = -\csc x, \quad \cot(-x) = -\cot x$$

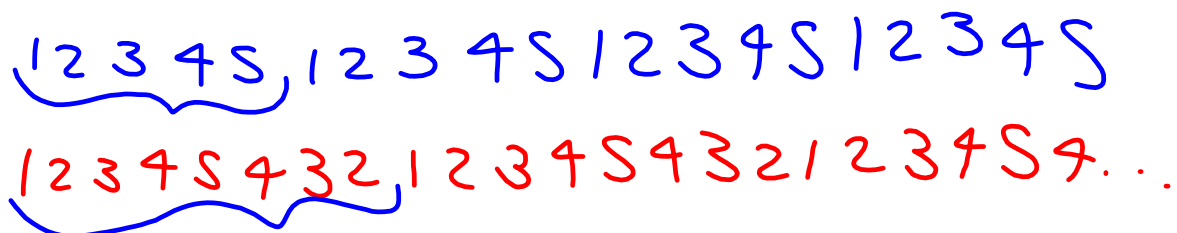
Domain/Range

The domain of a function is the set of all input values for which the function is defined (all the x-values that "make sense" when plugged into the function)

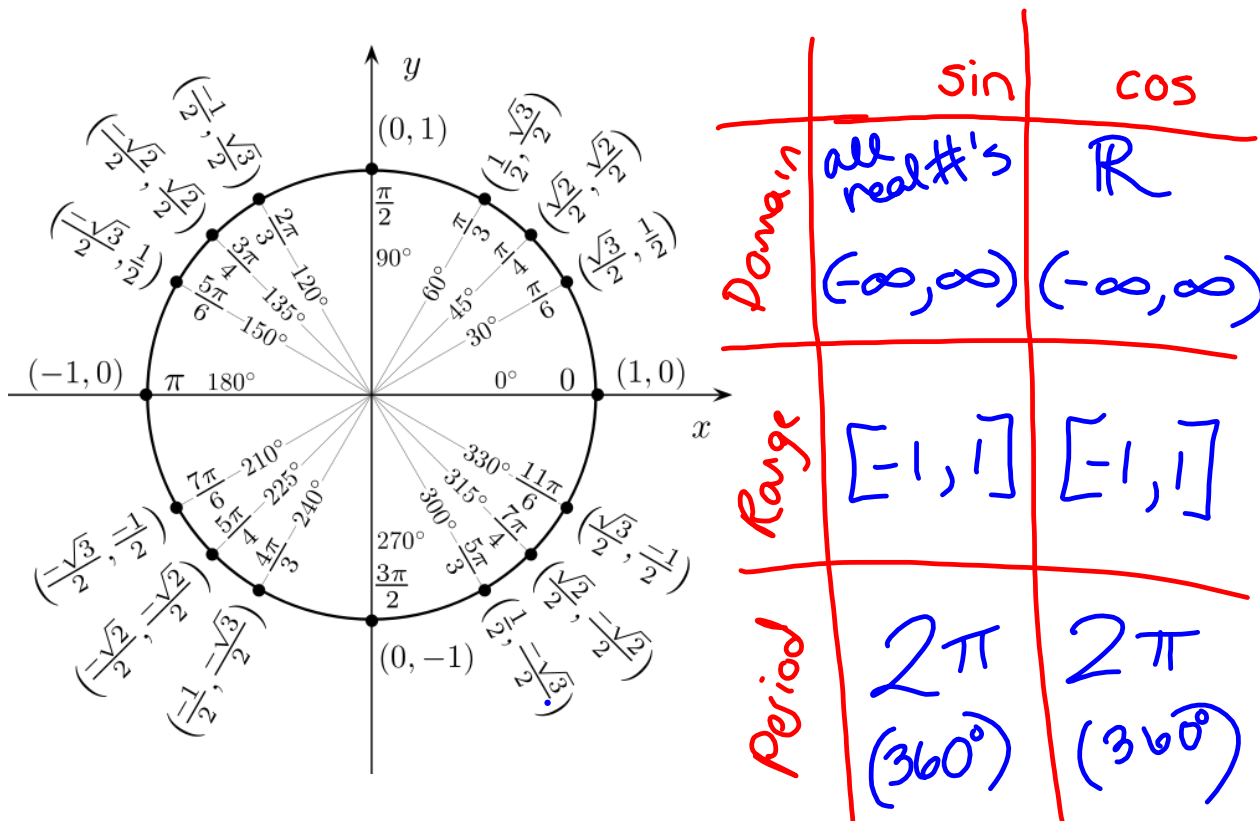
The range of a function is the output of the domain (all the y-values that the function takes on)

Periodicity

The period of a function is the smallest interval over which the function repeats itself



Determining domain, range and period for the Sine & Cosine functions



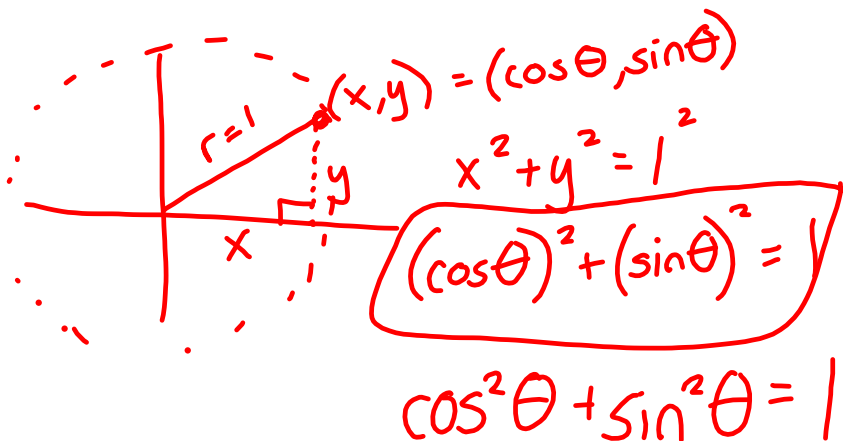
Identities $\csc x = \frac{1}{\sin x}$; $\sec x = \frac{1}{\cos x}$; $\cot x = \frac{1}{\tan x}$

reciprocal: $\sin x = \frac{1}{\csc x}$; $\cos x = \frac{1}{\sec x}$; $\tan x = \frac{1}{\cot x}$

ratio: $\tan x = \frac{\sin x}{\cos x}$; $\cot x = \frac{\cos x}{\sin x}$

pythagorean:

$$a^2 + b^2 = c^2$$



$$\frac{\sin^2 x + \cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$$

$$\frac{\sin^2 x}{\sin^2 x} + \frac{\cos^2 x}{\sin^2 x} = \frac{1}{\sin^2 x}$$

$$1 + \cot^2 x = \csc^2 x$$

$$\frac{\sin^2 x + \cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$$

$$\frac{\sin^2 x}{\cos^2 x} + \frac{\cos^2 x}{\cos^2 x} = \frac{1}{\cos^2 x}$$

$$\tan^2 x + 1 = \sec^2 x$$

Homework for Test #1:

Submitted 11/08:

- 5.1 #1, 2, 7 18 all, 31 74 all
- 4 problems on handout
- 5.2 #1 33odd

Due Friday 11/15:

- 5.2 #35-41odd; 59-75odd
- 5.3 #1-35odd; 37-48all; 61-68all
- 5.4 #1-22 all;
- **5.4 #33-39odd**

Due Monday 11/19:

- **5.4 #41-67odd; 71-97odd**
- **Test #1 Practice Problems (handout)**

Test #1 - Wednesday, 11/20

Quiz #3 - This Friday, 11/15