

H. Algebra II Semester II Review

Part 8 – Trigonometric Functions

Instructor: M. Wolverton

8.a Unit Circle

For the unit circle on the right, each angle θ is a multiple of 30° or 45° .

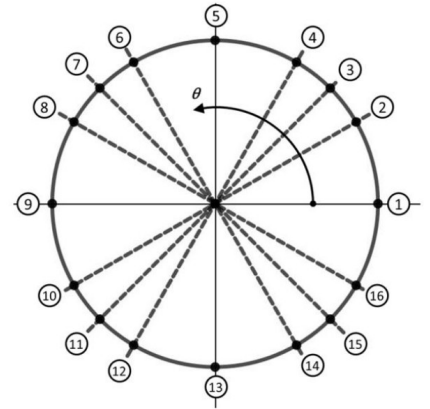
Find the following for each location:

- Angle measure in degrees
- Angle measure in radians
- Cartesian coordinates (x, y)

Define the six trigonometric functions in terms of x and y coordinates on the unit circle.

$$\sin \theta = \quad \cos \theta = \quad \tan \theta =$$

$$\sec \theta = \quad \csc \theta = \quad \cot \theta =$$



8.b Sine and Cosine Function Characteristics

Find the following characteristics of each function, then sketch a graph of the function with one full period. Check your graph with the coordinates of intercepts or extrema.

1. $f(x) = \sin(-3x)$
2. $f(x) = 3 + \sin\left(\frac{1}{2}x\right)$
3. $f(x) = -2 + \cos(4x)$
4. $f(x) = 2 \cos(\pi x) - 3$

Characteristics:

- Period (x spacing between maximums or zeros)
- X interval (between Max. - Center - Min. - Center ...)
- Maximum and Minimum Values (y values)
- Center Line (y value)

Recall that plain $\sin x$ and $\cos x$ have no domain restrictions (domain of all real numbers) but very restricted range of $-1 \leq y \leq 1$ and a period 2π of and an interval between extrema and center of $\frac{\pi}{2}$.

8.c Tangent Function Characteristics

Find the following characteristics of each function, then sketch a graph of the function. Check your graph with the coordinates of intercepts and asymptotes.

1. $f(x) = -\tan\left(\frac{1}{3}x\right)$
2. $\tan(2\pi x)$

Characteristics:

- Period (x spacing between asymptotes or zeros)
- Equations of Asymptotes

Recall that plain $\tan x$ has domain restrictions where $\cos x = 0$ $\left(x = \frac{2n+1}{2}\pi\right)$. These restrictions give the equations of the asymptotes.

Zeros will always occur half way between the asymptotes. $\tan x$ has a period of π .

8.d Solving Trigonometric Equations

Solve the following trigonometric equations to obtain all primary solutions (i.e. $0 \leq x < 2\pi$).

1. $2 \cos(3x) - 1 = 0$
2. $6 \sin^2 x - 7 \sin x + 2 = 0$
3. $\sin^2 x = 3 \cos^2 x$
4. $2 \cos x - 4 \sin x \cos x = 0$

Use the unit circle to locate solutions after you have reduced the complexity of the equation. If using an inverse function, be mindful of the restricted angle outputs.