

Warm Up 12/2

Write each fraction as a mixed number.

$$1) \frac{4}{3} = 1 \frac{1}{3}$$

$$2) \frac{5}{4} = 1 \frac{1}{4}$$

$$3) \frac{7}{6} = 1 \frac{1}{6}$$

$$4) \frac{3}{2} = 1 \frac{1}{2}$$

$$5) \frac{5}{3} = 1 \frac{2}{3}$$

$$6) \frac{11}{6} = 1 \frac{5}{6}$$

Are the following fractions greater or less than $\frac{1}{2}$?

$$7) \frac{2}{3} > \frac{1}{2}$$

$$8) \frac{1}{3} < \frac{1}{2}$$

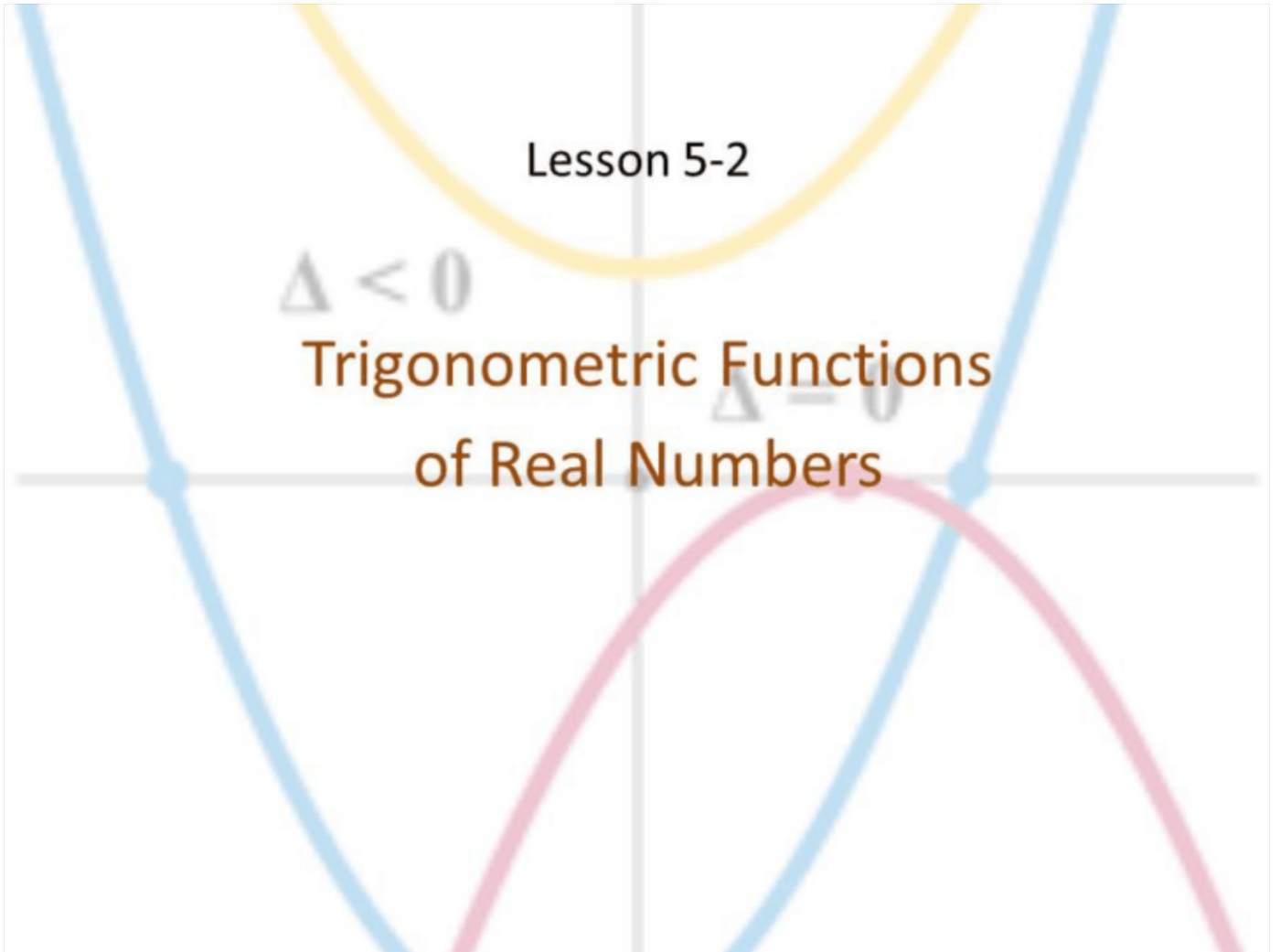
$$9) \frac{3}{4} > \frac{1}{2}$$

Lesson 5-2

$\Delta < 0$

Trigonometric Functions
of Real Numbers

$\Delta = 0$



Objective

Students will...

- Be able to know that the coordinates of radians, $(x, y) = (\cos t, \sin t)$
- Be able to evaluate trigonometric functions in radians.

Trigonometric Functions

The concept of trigonometric functions can be defined in terms of the unit circle. The definition of trigonometric functions is as follows: (x, y) .
 $t = \text{rad or deg.}$

$$\cos t = x$$

$$\sin t = y$$

$$\tan t = \frac{\sin t}{\cos t} = \frac{y}{x} \quad (x \neq 0)$$

$$\sec t = \frac{1}{\cos t} = \frac{1}{x}$$

$(x \neq 0)$

$$\csc t = \frac{1}{\sin t} = \frac{1}{y}$$

$(y \neq 0)$

$$\cot t = \frac{1}{\tan t} = \frac{x}{y} = \frac{\cos t}{\sin t}$$

$(y \neq 0)$

Evaluating Trigonometric Functions

We have computed the (x, y) coordinate for each of the values on the unit circle. Based on our definition above, $(x, y) = (\cos t, \sin t)$.

Consider the following units on the unit circle (Note that we are in radians):

$$0 = \overset{x, y}{(1, 0)} \rightarrow \cos 0 = 1, \sin 0 = 0, \tan 0 = \frac{\sin 0}{\cos 0} = \frac{0}{1} = 0.$$

$$\frac{\pi}{4} = \left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right) \rightarrow \cos \frac{\pi}{4} = \frac{\sqrt{2}}{2}, \sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}, \tan \frac{\pi}{4} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1.$$

$$\frac{\pi}{3} = \left(\frac{1}{2}, \frac{\sqrt{3}}{2}\right) \rightarrow \sin \frac{\pi}{3} = \frac{\sqrt{3}}{2} \quad \left(\cos \frac{\pi}{3} = \frac{1}{2}, \tan \frac{\pi}{3} = \frac{\sin \frac{\pi}{3}}{\cos \frac{\pi}{3}} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}\right)$$

$$\csc \frac{\pi}{3} = \frac{1}{\sin \frac{\pi}{3}} = \frac{1}{\frac{\sqrt{3}}{2}} = \frac{2}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$$

$$\sec \frac{\pi}{3} = \frac{1}{\cos \frac{\pi}{3}} = \frac{1}{\frac{1}{2}} = 2$$

$$\cot \frac{\pi}{3} = \frac{1}{\tan \frac{\pi}{3}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

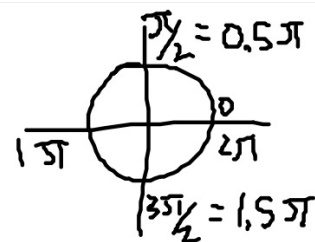
$$0 = \frac{0}{1}$$

$$\frac{\pi}{2} = (0, 1) \rightarrow \cos \frac{\pi}{2} = 0, \sin \frac{\pi}{2} = 1, \tan \frac{\pi}{2} = \frac{1}{0} = \text{DNE}$$

$$\sec \frac{\pi}{2} = \text{DNE}, \csc \frac{\pi}{2} = 1, \cot \frac{\pi}{2} = \frac{0}{1} = 0$$

$$\textcircled{\text{II}} \quad \frac{2\pi}{3} = \left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right) \rightarrow$$

sin cos tan.



$$\textcircled{\text{III}} \quad \frac{5\pi}{4} = \left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right) \rightarrow$$

$$= \left(\frac{1}{4}, \frac{1}{2}\right)$$

$$\frac{3\pi}{2} = (0, -1) \rightarrow$$

$\textcircled{\text{IV}}$

$$\frac{11\pi}{6} = \left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right) \rightarrow$$

$$\left(\frac{5}{6}, \frac{1}{6}\right)$$

csc, sec, cot

For the following, give the values for $\csc t$, $\sec t$, and $\cot t$

$$\frac{4\pi}{3} = (\quad , \quad)$$

Homework 12/2

TB pg. 416 #3, 4, 8, 9, 14, 18