4.3 Trigonometric Ratios

Coordinates in Terms of Primary Trigonometric Ratios

For any unit circle, given P(θ) = (x, y)

For any unit circle with radius r:

Reciprocal Trigonometric Ratios

By definition:

Example 1: Determine the Trigonometric Ratios for Angles in the Unit Circle

The point $A(-\frac{6}{7}, \frac{\sqrt{13}}{7})$ lies on the terminal arm of an angle θ in standard position and the unit circle.

Determine the values of the six trigonometric ratios for θ; express in lowest terms and rationalize.

Recall: CAST and Reference Angles

Example 2: Determine the <u>exact value</u> of each

a.) $\cos \dfrac{7\pi}{6}$

b.) $\sin\left(-\dfrac{5\pi}{3}\right)$

c.) $\cot 180°$

d.) $\csc 315°$

To determine the reference angle, we use the inverse trigonometric function ($\sin^{-1}$, $\cos^{-1}$, $\tan^{-1}$). Use the domain clues to determine which unit the answer should be in.

Example 3: Determine the measure of all angles that satisfy the following.

a.) $\cos \theta = 0.2837, \ 0 \le \theta < 2\pi$

b.) $\sin \theta = -0.9135, \ 0° \le \theta < 360°$

Example 4: Without a calculator, determine the exact value of all angles that satisfy the following.

a.) $\tan \theta = \dfrac{1}{\sqrt{3}}, \ -2\pi \le \theta < 2\pi$

b.) $\csc \theta = -\frac{2\sqrt{3}}{3}, 0 \le \theta < 2\pi$

Try: Find the angle in the domain of $0 \le \theta < 2\pi$.

a.) $\sec \theta = -7.8147$

b.) No calculator: $\sin \theta = -0.5$

Try: The point A(12, -5) lies on the terminal arm of an angle θ in standard position. Find the exact value of each trigonometric ratio for θ (sin, cos, tan, sec, csc, cot)