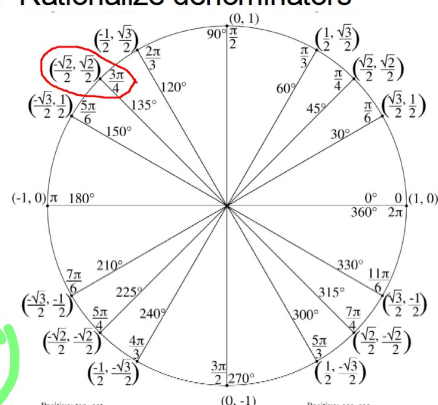## Problem 1

Find the EXACT value of each. Rationalize denominators and simplify fractions.

1. $\text{Cos}\dfrac{43\pi}{4}$

Find a coterminal angle by subtracting 2π in the form $8\pi/4$ until you get an angle between 0 and 2π.
You can do this five times to get $3\pi/4$

$\text{Cos}\,\theta$ is the x-coordinate at that point.

$\text{Cos}(43\pi/4) = \text{Cos}(3\pi/4) = -\dfrac{\sqrt{2}}{2}$

Problem 2

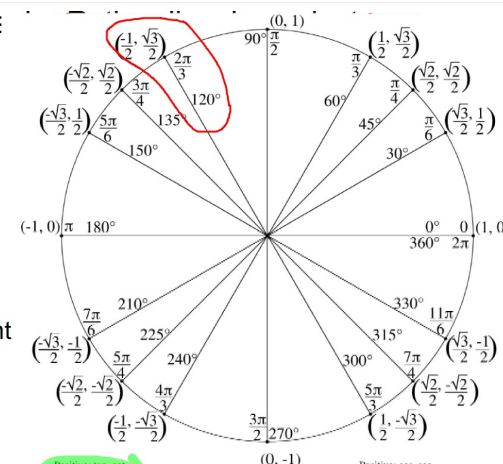Find the EXACT value of each. Rationalize denominators and simplify fractions.

2. $\text{Tan}(-2040°)$

Find a coterminal angle by adding 360° until you get an angle between 0 and 360°.
You eventually get 120°

$\text{Tan}\,\theta$ is the ratio of y/x at that point

$\text{Tan}(-2040°) = \text{Tan}(120°) =$

$$\dfrac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \dfrac{\sqrt{3}}{2}\cdot\dfrac{2}{-1} = -\sqrt{3}$$

Problem 3

Find the EXACT value of each. Rationalize denominators and simplify fractions.
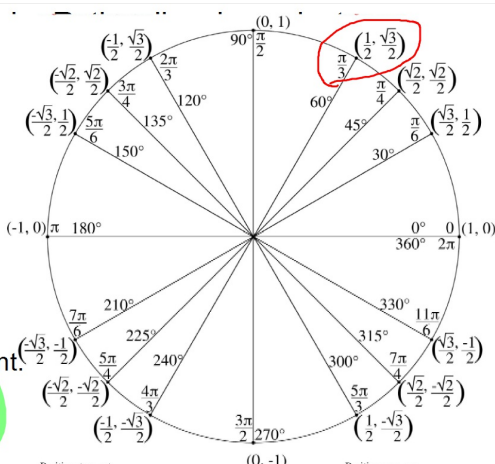
3. $\text{Sin}\left(\dfrac{-29\pi}{3}\right)$

Find a coterminal angle by adding 2π in the form $6\pi/3$ until you get an angle between 0 and 2π.
You can do this five times to get $\pi/3$

$\text{Sin}\,\theta$ is the y-coordinate at that point.
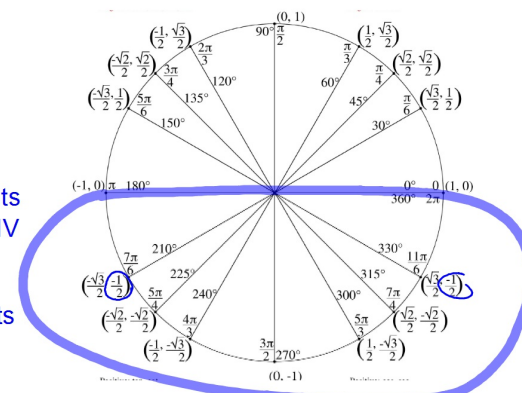
$\text{Sin}(-29\pi/3) = \text{Sin}(\pi/3) = \dfrac{\sqrt{3}}{2}$

Problem 4

Find all values of θ $(0° \le \theta \le 360°)$ that meet the following conditions.

4. $\text{Sin}\,\theta = \dfrac{-1}{2}$

$\text{Sin}\,\theta$ is the y-coordinate.
Since Sin is negative you only need to look in the Quadrants where y is negative: Quad III & IV

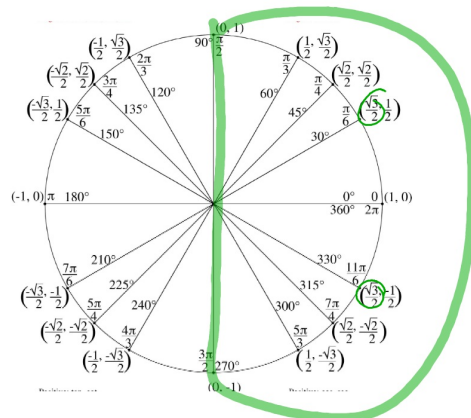the two angles in these quadrants where y is -1/2 are:

$\theta = 210° \ \& \ 330°$

Find all values of θ (0° ≤θ≤360°) that meet the following conditions.

5. $\text{Cos}\theta = \dfrac{\sqrt{3}}{2}$

Cosθ is the x-coordinate.
Since Cos is Positive you
only need to look in the Quadrants
where x is positive: Quad I & IV

the two angles in these quadrants
where y is $\dfrac{\sqrt{3}}{2}$ are:

$\theta = 30°$ ε, 330°

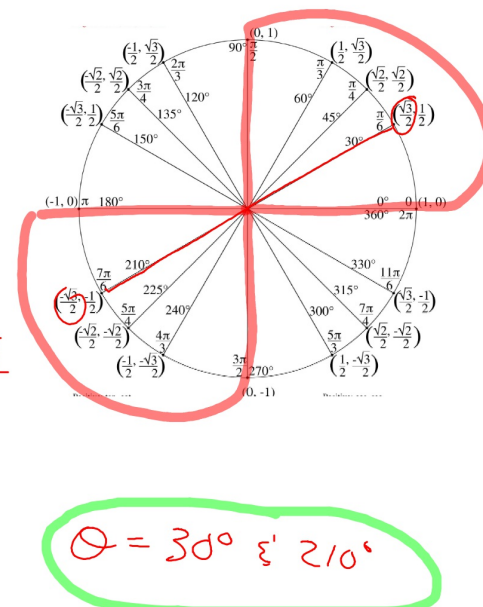Find all values of θ (0° ≤θ≤360°) that meet the following conditions.

6. $\text{Tan}\theta = \dfrac{\sqrt{3}}{3}$

Tanθ is the ratio of y/x.
Since Tan is Positive you
only need to look in the Quadrants
where x & y have the same sign:
Quad I & III

$\dfrac{y}{x} = \dfrac{\sqrt{3}}{3}$ if $y = \dfrac{1}{2}$ and $x = \dfrac{\sqrt{3}}{2}$

$\dfrac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \dfrac{1}{\sqrt{3}} \cdot \dfrac{\sqrt{3}}{\sqrt{3}} = \dfrac{\sqrt{3}}{3}$

the two angles in these quadrants
where y/x is $\dfrac{\sqrt{3}}{3}$ are:

$\theta = 30°$ ε, 210°

Given $\tan\theta = -\sqrt{3}$ and $\sin = \dfrac{\sqrt{3}}{2}$ find θ.

$\sin = \dfrac{\sqrt{3}}{2}$	$\tan\theta = -\sqrt{3}$
Sin is pos in Quad I and II	Tan is neg in Quad II and IV

these two are BOTH true only
in Quad II.

In Quad II $\sin = \dfrac{\sqrt{3}}{2}$

    when θ=120°