Questions from Homework

5.

$$\frac{\sin 45^\circ}{\cos 30^\circ}$$

$$\frac{\left(+\frac{\sqrt{2}}{2}\right)}{\left(+\frac{\sqrt{3}}{2}\right)}$$

$$\frac{\sqrt{2}}{2} \times \frac{2}{\sqrt{3}}$$

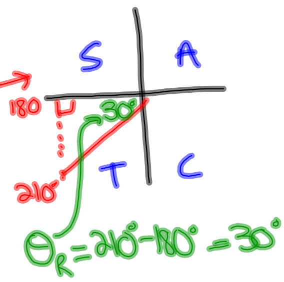
$$\frac{\sqrt{2}}{\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

$$\boxed{\frac{\sqrt{6}}{3}}$$

13.

$$\frac{\sin 90^\circ + \cos^2 210^\circ}{\cos 390^\circ}$$

$$\frac{\sin 90^\circ + \cos^2 210^\circ}{\cos 30^\circ}$$



$$\frac{(1) + \left(-\frac{\sqrt{3}}{2}\right)^2}{\left(\frac{\sqrt{3}}{2}\right)}$$

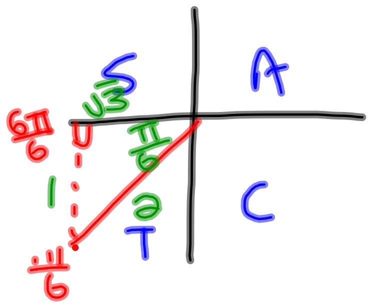
$$\frac{1 + \frac{3}{4}}{\frac{\sqrt{3}}{2}}$$

$$\frac{7}{4} \times \frac{2}{\sqrt{3}}$$

$$\frac{7}{2\sqrt{3}} \cdot \frac{\sqrt{3}}{\sqrt{3}}$$

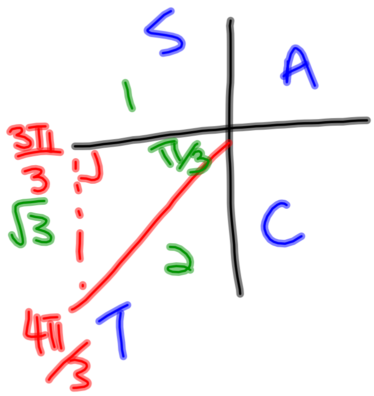
$$\boxed{\frac{7\sqrt{3}}{6}}$$

(8) $$\frac{\sin\frac{7\pi}{6}+\cos\frac{4\pi}{3}}{\tan^2\frac{\pi}{3}}$$



$$\frac{\left(-\frac{1}{2}\right)+\left(-\frac{1}{2}\right)}{\left(\frac{\sqrt{3}}{1}\right)^2}$$

$$\theta_R=\frac{7\pi}{6}-\frac{6\pi}{6}=\frac{\pi}{6}$$



$$\frac{-\frac{2}{2}}{3}$$

$$\boxed{-\frac{1}{3}}$$

$$\theta_R=\frac{4\pi}{3}-\frac{3\pi}{3}=\frac{\pi}{3}$$

Warm-Up

3. If θ is an angle in standard position with the following conditions, in which quadrants may θ terminate?

a) $\cos\theta > 0$ Q1 , Q4

b) $\tan\theta < 0$ Q2, Q4

c) $\sin\theta < 0$ Q3, Q4

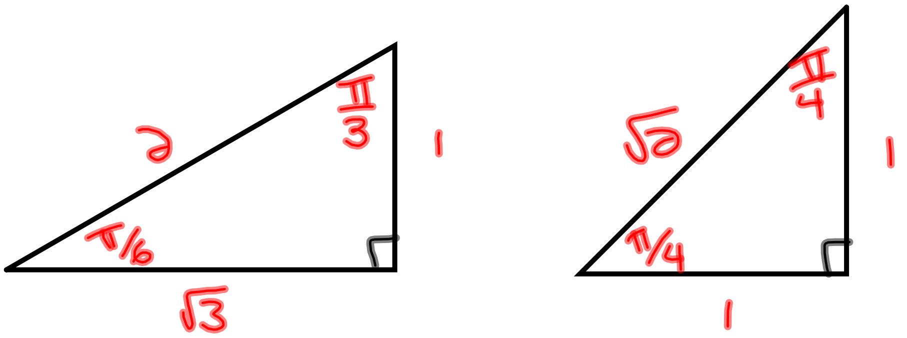
d) $\sin\theta > 0$ and $\cot\theta < 0$ Q2

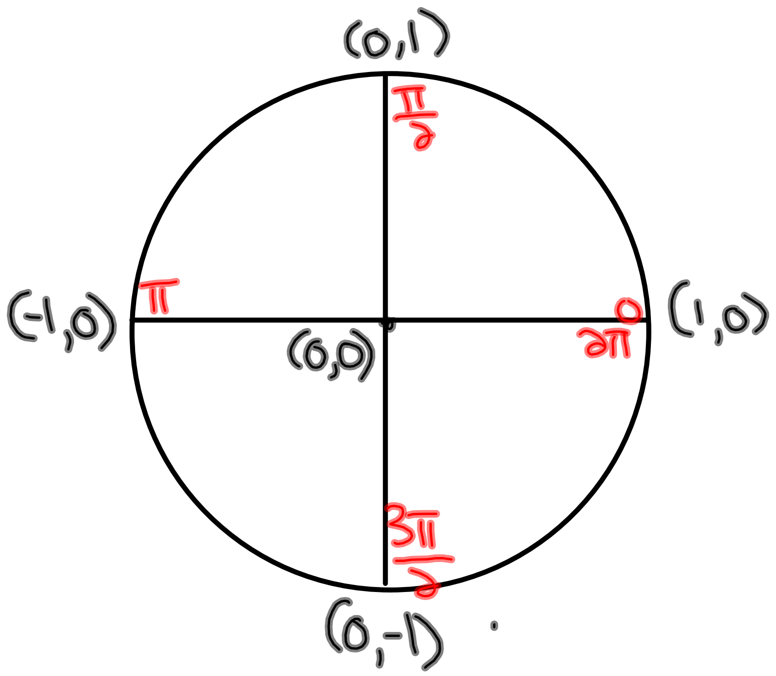
e) $\cos\theta < 0$ and $\csc\theta > 0$ Q2

f) $\sec\theta > 0$ and $\tan\theta > 0$ Q1

Warm-Up

Draw the special angle triangles and the unit circle.





Special Angles

	30	60
Sin	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$
Cos	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$
Tan	$\frac{\sqrt{3}}{3}$	$\sqrt{3}$

	45
Sin	$\frac{\sqrt{2}}{2}$
Cos	$\frac{\sqrt{2}}{2}$
Tan	1

Quadrantal Angles

	0^0	90^0	180^0	270^0	360^0
sin	0	1	0	-1	0
cos	1	0	-1	0	1
tan	0	undefined	0	undefined	0

Example 4

Find Angles Given Their Trigonometric Ratios

Determine the measures of all angles that satisfy the following. Use diagrams in your explanation.

a) $\sin \theta = 0.879$ in the domain $0 \leq \theta < 2\pi$. Give answers to the nearest tenth of a radian.

b) $\cos \theta = -0.366$ in the domain $0° \leq \theta < 360°$. Give answers to the nearest tenth of a degree.

c) $\tan \theta = \sqrt{3}$ in the domain $-180° \leq \theta < 180°$. Give exact answers.

d) $\sec \theta = \frac{2}{\sqrt{3}}$ in the domain $-2\pi \leq \theta < 2\pi$. Give exact answers.

Trig Equations (Approximate) Use Calculator

a) $\sin\theta = 0.879$ in the domain $0 \le \theta < 2\pi$ radians

$\theta = \sin^{-1}(0.879)$

$\theta = 1.1 \rightarrow$ Q1

what quadrants is sin positive?

Q1 and Q2

Q1	Q2
$\theta = ref$	$\theta = \pi - ref$
$\theta = 1.1$	$\theta = 3.14 - 1.1$
	$\theta = 2.04$
	$\theta = 2$

b) $\cos\theta = -0.366$ $0° \le \theta < 360°$ in degrees

$\theta = \cos^{-1}(-0.366)$

$\theta = 111.5°$

Where is cos negative?

Q2 + Q3

Q2	Q3
$\theta = 180° - ref$	$\theta = 180° + ref$
$111.5 = 180 - ref$	$\theta = 180° + 68.5°$
$ref = 180° - 111.5°$	$\theta = 248.5°$
$ref = 68.5°$	

Trig Equations (Exact) No Calculator

c) $\tan\theta = \sqrt{3}$ $\quad -180° \le \theta < 180°$

in degrees.

① Find θ_R by looking at diagrams

ref $= 60°$

② Find the Quadrants where tan is positive (Use CAST) Q1 + Q3

③ Use appropriate Formula

Q1	Q3
$\theta = ref$	$\theta = 180° + ref$
$\boxed{\theta = 60°}$	$\theta = 180° + 60°$
	$\theta = 240°$ ← Not a Solution. Not in domain

$\theta = 60° - 180°$

$\boxed{\theta = -120°}$

$\sec\theta = \frac{2}{\sqrt{3}}$ (hyp / adj) $\quad -2\pi \le \theta < 2\pi$

① ref $= \frac{\pi}{6}$

② sec is positive in Q1 + Q4

Q1	Q4
$\theta = ref$	$\theta = 2\pi - ref$
$\theta = \boxed{\frac{\pi}{6}}$	$\theta = 2\pi - \frac{\pi}{6}$
	$\theta = \frac{12\pi - \pi}{6} = \boxed{\frac{11\pi}{6}}$

$\theta = \frac{\pi}{6} - 2\pi$

$\theta = \boxed{\frac{-11\pi}{6}}$

$\theta = \frac{11\pi}{6} - 2\pi$

$\theta = \boxed{\frac{-\pi}{6}}$

Key Ideas

- Points that are on the intersection of the terminal arm of an angle θ in standard position and the unit circle can be defined using trigonometric ratios.

  $P(\theta) = (\cos\theta, \sin\theta)$

- Each primary trigonometric ratio—sine, cosine, and tangent—has a reciprocal trigonometric ratio. The reciprocals are cosecant, secant, and cotangent, respectively.

  $\csc\theta = \frac{1}{\sin\theta}$ $\sec\theta = \frac{1}{\cos\theta}$ $\cot\theta = \frac{1}{\tan\theta}$

  If $\sin\theta = \frac{2}{3}$, then $\csc\theta = \frac{3}{2}$, and vice versa.

- You can determine the trigonometric ratios for any angle in standard position using the coordinates of the point where the terminal arm intersects the unit circle.
- Exact values of trigonometric rations for special angles such as 0, $\frac{\pi}{6}$, $\frac{\pi}{4}$, $\frac{\pi}{3}$, and $\frac{\pi}{2}$ and their multiples may be determined using the coordinates of points on the unit circle.
- You can determine approximate values for trigonometric ratios using a calculator in the appropriate mode: radians or degrees.
- You can use a scientific or graphing calculator to determine an angle measure given the value of a trigonometric ratio. Then, use your knowledge of reference angles, coterminal angles, and signs of ratios in each quadrant to determine other possible angle measures. Unless the domain is restricted, there are an infinite number of answers.
- Determine the trigonometric ratios for an angle θ in standard position from the coordinates of a point on the terminal arm of θ and right triangle definitions of the trigonometric ratios.

Homework

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Attachments

Trig Expressions Review #2.pdf