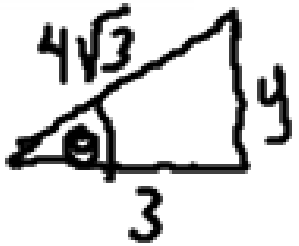
12. Determine the exact values of the other five trigonometric ratios under the given conditions.

$\sin\theta = \frac{O}{H}$ $\cos\theta = \frac{A}{H}$

etc

d) $\sec\theta = \frac{4\sqrt{3}}{3}$, $-180° \leq \theta \leq 180°$

$\frac{1}{\cos\theta} = \frac{4\sqrt{3}}{3}$



$3^2 + y^2 = (4\sqrt{3})^2$

$9 + y^2 = 48$

$y^2 = 39$

$y = \pm\sqrt{39}$

$\cos\theta = \frac{3}{4\sqrt{3}}$ $\frac{A}{H}$

$\sin\theta = \frac{\pm\sqrt{39}}{4\sqrt{3}} = \frac{\pm\sqrt{13}}{4}$

$\tan\theta = \frac{O}{A} = \frac{\pm\sqrt{39}}{3}$

$$\csc\theta = \frac{1}{\sin\theta} = \frac{\pm 4}{\sqrt{13}} \cdot \frac{\sqrt{13}}{\sqrt{13}} = \pm\frac{4\sqrt{13}}{13}$$

$$\cot\theta = \frac{1}{\tan\theta} = \frac{\pm 3}{\sqrt{39}} \cdot \frac{\sqrt{39}}{\sqrt{39}} = \frac{\pm 3\sqrt{39}}{39} = \frac{\pm\sqrt{39}}{13}$$

* if I give you the ratio you build a triangle, find the missing side and use opp, adj, and hyp to find all other ratios *

Pg 203

15. a) Determine the positive value of $\sin(\cos^{-1} 0.6)$. Use your knowledge of the unit circle to explain why the answer is a rational number.

b) Without calculating, what is the positive value of $\cos(\sin^{-1} 0.6)$? Explain.

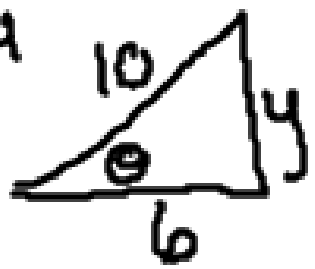
Question: what is the sin of the θ?

$\cos^{-1}(0.6) = \theta$

θ

$\cos\theta = 0.6$ ratio of the side lengths of the triangle

$\cos\theta = \frac{6}{10}$ A / H



$6^2 + y^2 = 10^2$

$y^2 = 100 - 36$

$y^2 = 64 \rightarrow y = \pm 8$

$\sin\theta = \frac{8}{10}$

$\sin(\cos^{-1}(0.6))$

$= 0.8$

4.4

Introduction to Trigonometric Equations

Focus on…

- algebraically solving first-degree and second-degree trigonometric equations in radians and in degrees
- verifying that a specific value is a solution to a trigonometric equation
- identifying exact and approximate solutions of a trigonometric equation in a restricted domain
- determining the general solution of a trigonometric equation

2. Solve for θ, $0° \le \theta \le 360°$.

① rearrange eq'n to be $\sin\theta =$

(a) $2\sin\theta + \sqrt{3} = 0$

$2\sin\theta = -\sqrt{3}$

$\sin\theta = -\frac{\sqrt{3}}{2}$ (on unit circle)

$\theta = \{240°, 300°\}$

$-5\cos\theta$ -1 $-5\cos\theta$ -1

(b) $2\cos\theta + 1 = 5\cos\theta + 2$, $0° \le \theta \le 360°$.

*put the cos terms together and put the constants together

$-3\cos\theta = 1$

$\cos\theta = -\frac{1}{3}$

*calc to find θ (Degree) *

$\theta = \cos^{-1}(-1/3)$

$\theta = 109.47$ ✓

cos = neg

QII and QIII

$\theta_R = 180° - 109.47°$

$= 70.53°$

QIII: $180° + 70.53° = 250.53°$

$\theta = \{109.47°, 250.53°\}$

3. Solve each equation in the specified domain.

(a) $\sqrt{2}\cos x - 1 = 0$ $\quad [-2\pi, 2\pi]$

$\cos x = \frac{1}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}}$

$\cos x = \frac{\sqrt{2}}{2}$ (on unit circle)

$x = \frac{\pi}{4}$ $\quad x = \frac{7\pi}{4}$ $\quad x = \{-\frac{7\pi}{4}, -\pi/4, \pi/4, 7\pi/4\}$

coterminal $\frac{\pi}{4} - 2\pi$ $\quad \frac{7\pi}{4} - 2\pi$

$\frac{\pi}{4} - \frac{8\pi}{4}$ $\quad \frac{7\pi}{4} - \frac{8\pi}{4}$

$-\frac{7\pi}{4}$ $\quad -\pi/4$

(b) $4\cot\theta + 3 = -2\cot\theta - 8$

$(0,360°)$

FINAL

$\theta = \{151.4°, 331.4°\}$

$6\cot\theta = -11$

$\cot\theta = \frac{-11}{6}$

$\frac{1}{\tan\theta} = \frac{-11}{6}$

$\tan\theta = -\frac{6}{11}$ * use calc (degrees)

$\theta = -28.6°$ not okay → not in the given domain

$-28.6° + 360° = 331.4°$ ✓

$\theta_R = 28.6°$

$\theta = 180° - 28.6° = 151.4°$

where is $\tan -$? QII

HW: pg 211 #1-5 and triangle puzzle