Ch 4.3 Day 3

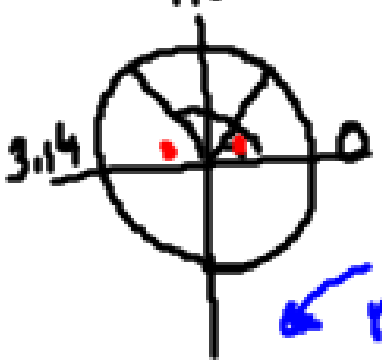
Finding Angles Given Their Trigonometric Ratios

← radians

A) $\sin\theta = 0.654, \quad 0 \le \theta < 2\pi$

← 1 full rotation

1.57 QI + II



← NOT MULTIPLICATION

$\sin^{-1}(\sin\theta) = \sin^{-1}(0.654)$

$\theta = \sin^{-1}(0.654)$

$\theta_1 = 0.7128$ rad QI

$\theta_2 = \pi - 0.7128$

$= 2.4287$

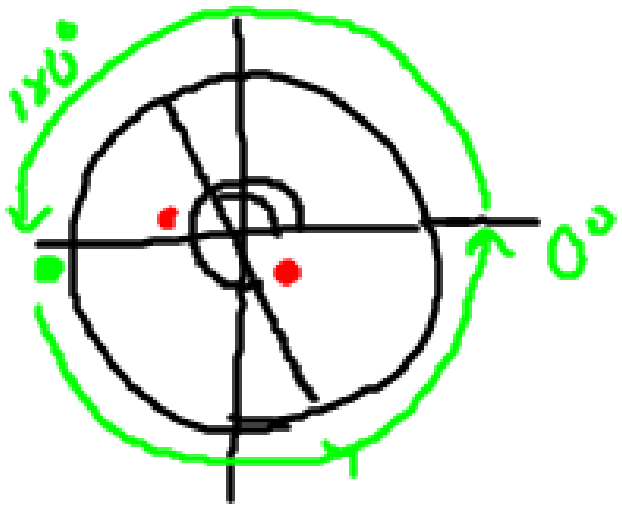
Interval:

$\theta = \begin{cases} 0.71 \\ 2.43 \end{cases}$

B) $\tan\theta = -1.235$, $-180° \le \theta < 180°$

QII → QIV

↑ degrees



$\theta_2 = 180° - 51°.00$

$= 129°.06$

$\theta = \begin{cases} -51°.06 \\ 129°.00 \end{cases}$

$\tan^{-1}(\tan\theta) = \tan^{-1}(-1.235)$

$\theta = \tan^{-1}(-1.235)$

$\theta_1 = -51°.00$ QIV

$\theta_1 = 360° + (-51°.06)$

$= 309°.06$

C) $\csc\theta = \frac{2}{\sqrt{3}}$,

$-2\pi \le \theta < 2\pi$

$\frac{-6\pi}{3}$ $\frac{6\pi}{3}$

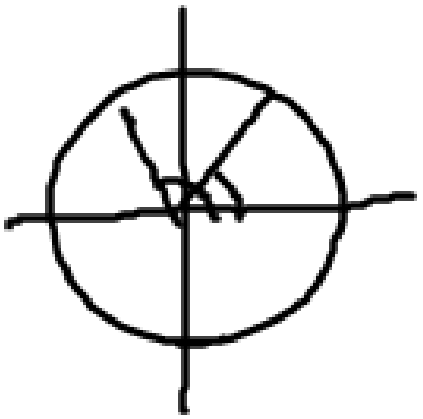
$\frac{1}{\sin\theta} = \frac{2}{\sqrt{3}}$

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

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

unit circle value. Exact answers

QI & II



$\theta = \begin{cases} \frac{\pi}{3} \\ \frac{2\pi}{3} \end{cases} + 2\pi k,\ k \in I$

full rotations

$\frac{6\pi}{3}$

general solution

Interval:

$\theta = \begin{cases} \frac{\pi}{3}, \frac{-5\pi}{3} \\ \frac{2\pi}{3}, \frac{-4\pi}{3} \end{cases}$

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5. For each point, sketch two coterminal angles in standard position whose terminal arm contains the point. Give one positive and one negative angle, in radians, where neither angle exceeds one full rotation.

a) (3, 5)

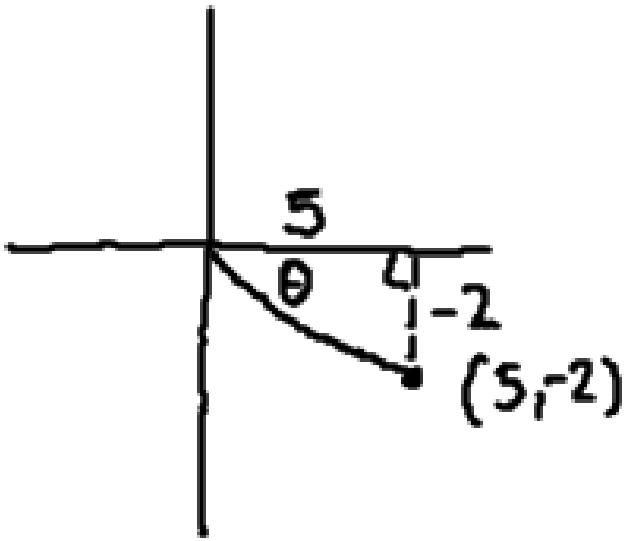
b) (−2, −1)

c) (−3, 2)

d) (5, −2)

$\tan\theta = \frac{O}{A}$

QIV



$\tan\theta = \frac{-2}{5}$

$\theta = \tan^{-1}\left(\frac{-2}{5}\right)$

$\theta = -0.38$ radians

↑ negative rotation

positive rotation

$\theta_2 = 2\pi - 0.38$

$= 5.90$ rad.

pg 202 No calculator. DO NOT SOLVE FOR THE ANGLE

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

a) $\sin\theta = \frac{3}{5}, \frac{\pi}{2} < \theta < \pi$

b) $\cos\theta = \frac{-2\sqrt{2}}{3}, -\pi \le \theta \le \frac{3\pi}{2}$

c) $\tan\theta = \frac{2}{3}, -360° < \theta < 180°$

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

$a^2+b^2=c^2$

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

$y^2=48-9$

$y^2=39$

$y=\pm\sqrt{39}$

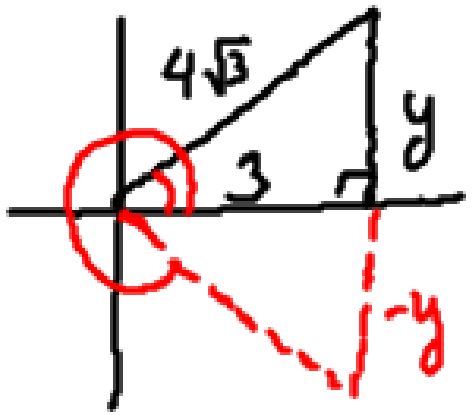
$\tan\theta=\frac{O}{A}=\frac{\pm\sqrt{39}}{3}$

$\cot\theta=\frac{A}{O}=\frac{3}{\pm\sqrt{39}}\left(\frac{\sqrt{39}}{\sqrt{39}}\right)$

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

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

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



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

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

$\cos\theta=\frac{3}{4\sqrt{3}}\left(\frac{\sqrt{3}}{\sqrt{3}}\right)$

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

$\csc\theta=\frac{H}{O}=\frac{4\sqrt{3}}{\pm\sqrt{39}}$

$=\frac{\pm 4}{\sqrt{13}}$

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

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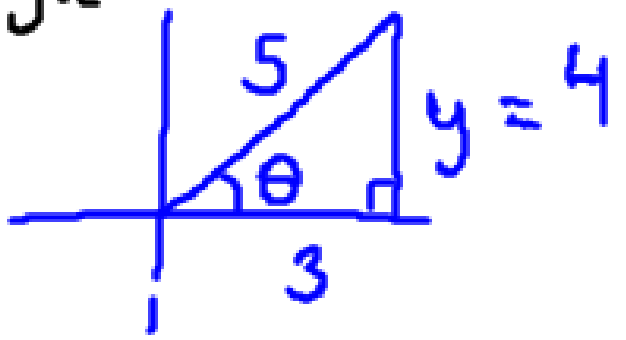
NO CALCULATOR

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.

$\sin\theta = \frac{O}{H}$ } ratio of side lengths

angle



Pythagorean Triple 3-4-5

$\sin(\underbrace{\cos^{-1} 0.6}_{\text{angle}})$

let $\theta = \cos^{-1} 0.6$

ratio of side lengths

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

$\cos\theta = 0.6 = \frac{3}{5}\left(\frac{A}{H}\right)$

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

$\sin\theta = \frac{4}{5}$

$\sin(\cos^{-1}(0.6)) = 0.8$

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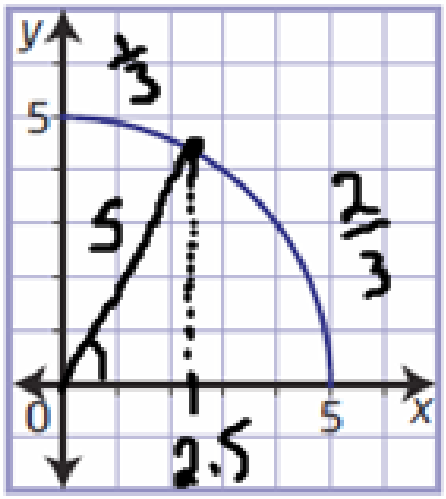
21. The diagram shows a quarter-circle of radius 5 units. Consider the point on the curve where $x = 2.5$. Show that this point is one-third the distance between (0, 5) and (5, 0) on the arc of the circle.



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

$\cos\theta = \frac{2.5}{5}$

HW: pg 202 #10-14,17,18,19, C4