Math 166

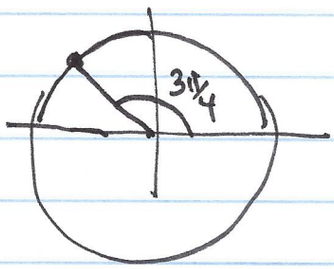
HW 9 -

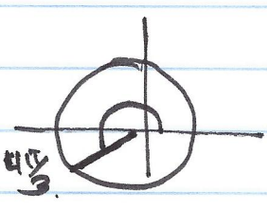
p406

5.1

#54 a) $\frac{3\pi}{4} \rightarrow 135 \rightarrow$ ref $\therefore \frac{\pi}{4}$ QII (QII)

b) $\frac{4\pi}{3}$ (QIII) ref $\frac{\pi}{3}$ QIII





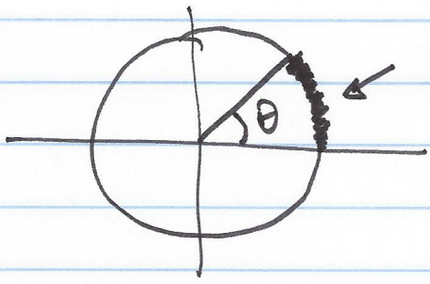
#60 a) $315° \cdot \frac{\pi}{180} = \boxed{\frac{7\pi}{4}}$

b) $120° \cdot \frac{\pi}{180} = \boxed{\frac{2\pi}{3}}$ (QII)

#84 $\frac{3\pi}{4}$ complement (None).

Supplement. $\frac{\pi}{4}$ Because $\frac{3\pi}{4} + \frac{\pi}{4} = \boxed{\pi}$

#98

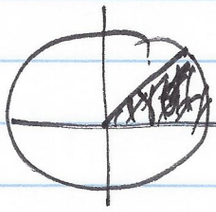


arc length = part of Circumference.

$= \frac{\theta}{2\pi} \cdot 2\pi r$

arc length

$\boxed{s = \theta r}$



Sector = part of area.

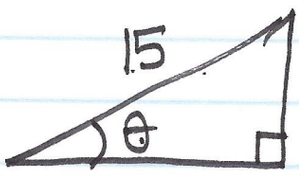
$\frac{\theta}{2\pi} \cdot \pi r^2$

$s = 3 \quad \theta = \frac{4\pi}{3}$ Sector $= \frac{1}{2}\theta r^2$

$s = \theta r \rightarrow r = \frac{s}{\theta} = \frac{3}{\frac{4\pi}{3}} = \frac{9}{4\pi} \approx 0.72$ m

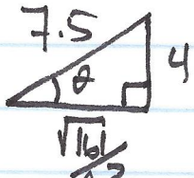
5.2 p416-417

#12



$\sqrt{15^2 - 8^2}$

$\sqrt{161}$



$\frac{\sqrt{161}}{2}$

Similar by AA

$\frac{\sqrt{161}}{15} = \frac{adj}{hyp} = \cos\theta$

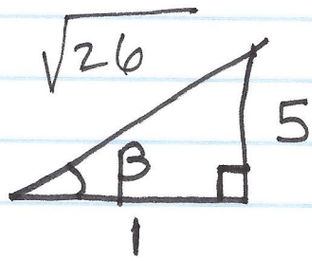
$\sin\theta = \frac{opp}{hyp} = \frac{8}{15}$ $\quad \csc\theta = \frac{15}{8}$

$\sec\theta = \frac{15}{\sqrt{161}}$

$\tan\theta = \frac{opp}{adj} = \frac{8}{\sqrt{161}}$ $\quad \cot\theta = \frac{\sqrt{161}}{8}$

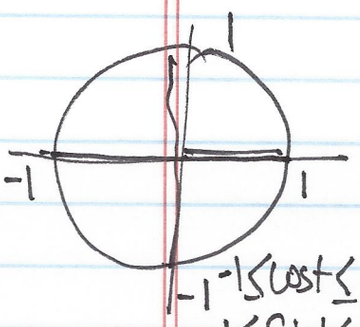
#58

$\tan\beta = \frac{5}{1} = \frac{\sin\beta}{\cos\beta}$



β in QI or QIII

a) $\cot\beta = \frac{1}{\tan\beta} = \frac{1}{5}$



$-1 \le \cos t \le 1$

$-1 \le \sin t \le 1$

b) $\cos\beta = \frac{\blacksquare}{\sqrt{26}}$ or $\cos\beta = \frac{-1}{\sqrt{26}}$

c) $\tan(90 - \beta) = \cot(\beta) = \frac{1}{5}$

$\sin(\frac{\pi}{2} - x) = \cos x$

$\cos(\frac{\pi}{2} - x) = \sin x$

$\tan(\frac{\pi}{2} - x) = \cot x$.

$\cot(\frac{\pi}{2} - x) = \tan x$.

$\sec(\frac{\pi}{2} - x) = \csc(x)$

$\csc(\frac{\pi}{2} - x) = \sec(x)$

d) $\csc\beta = \frac{\sqrt{26}}{5}$

or $\csc\beta = -\frac{\sqrt{26}}{5}$

#64 $(\csc\theta + \cot\theta)(\csc\theta - \cot\theta) = 1$

LHS = RHS.

$$\csc^2\theta - \cot^2\theta = 1 \checkmark$$

$\cos^2\theta + \sin^2\theta = 1$ → $\cos^2\theta = 1 - \sin^2\theta$

$\sin^2\theta = 1 - \cos^2\theta$.

$1 + \tan^2\theta = \sec^2\theta$ → $\tan^2\theta = \sec^2\theta - 1$

$1 = \sec^2\theta - \tan^2\theta$

$\cot^2\theta + 1 = \csc^2\theta$ → $\cot^2\theta = \csc^2\theta - 1$

$1 = \csc^2\theta - \cot^2\theta$

#66 $\dfrac{\tan\theta + \cot\theta}{\tan\theta} = \csc^2\theta$

$1 + \cot^2\theta = \csc^2\theta \checkmark$

#72 (a) $\cot\theta = \dfrac{\sqrt{3}}{3}$

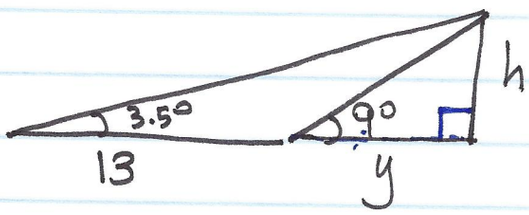
$\theta = \pi/3$ ✓

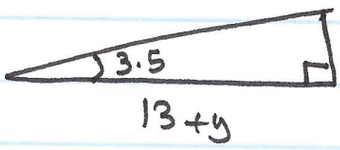
θ	0	$\pi/6$	$\pi/4$	$\pi/3$	$\pi/2$
$\sin\theta$	0	$1/2$	$\sqrt{2}/2$	$\sqrt{3}/2$	1
$\cos\theta$	1	$\sqrt{3}/2$	$\sqrt{2}/2$	$1/2$	0
$\tan\theta$	0	$1/\sqrt{3} = \sqrt{3}/3$	1	$\sqrt{3}$	und
$\cot\theta$	und	$\sqrt{3}$	1	$\sqrt{3}/3$	0.

b) $\sec\theta = \sqrt{2}$ $\theta = \pi/4$

$\dfrac{\sqrt{2}}{2} = \dfrac{\sqrt{2}}{\sqrt{2}\sqrt{2}} = \dfrac{1}{\sqrt{2}}$

#80





$$\tan 3.5 = \frac{h}{(13+y)} \longrightarrow y$$

$$\tan 9^\circ = \frac{h}{y} \longrightarrow y$$

$$13\tan 3.5 + y\tan 3.5 = h.$$

$$\boxed{y = \frac{h - 13\tan 3.5}{\tan 3.5}}$$

$$y\tan 9^\circ = h.$$

$$\boxed{y = \frac{h}{\tan 9^\circ}}$$

$$\frac{h - 13\tan 3.5}{\tan 3.5} = \frac{h}{\tan 9}$$

$$\frac{h}{\tan 3.5} - 13 = \frac{h}{\tan 9} \longrightarrow h\left(\frac{\tan 9 - \tan 3.5}{\tan 3.5 \tan 9}\right) = 13$$

$$h\left(\frac{1}{\tan 3.5} - \frac{1}{\tan 9^\circ}\right) = \frac{h}{\tan 3.5} - \frac{h}{\tan 9} = 13$$

$$h = \frac{13\tan 3.5 \tan 9}{\tan 9 - \tan 3.5} = 1.29\,\text{mi}$$

5.3 (429)

#72 $300°$

Q IV

reference Angle $60° = \pi/3$.

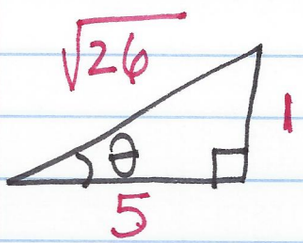
$\cos(300) = \cos\frac{\pi}{3} = \boxed{\frac{1}{2}}$ ✓

$\sin(300) = -\sin(60) = -\frac{\sqrt{3}}{2}$

$\tan(300) = -\tan(60) = -\sqrt{3}$ ✓

#96 $\cot\theta = -\frac{5}{1}$; $\sin\theta > 0$

θ in Q.II ~~&~~ Q.IV $\qquad$ θ in Q.I ~~&~~ Q.II



θ in Q.II

$\tan\theta = -\frac{1}{5}$

$\sin\theta = \frac{1}{\sqrt{26}}$

$\cos\theta = -\frac{5}{\sqrt{26}}$

$\sec\theta = -\frac{\sqrt{26}}{5}$

$\csc\theta = \sqrt{26}$ ✓

#118

$\cos(t) = -\frac{3}{4}$

a) $\cos(-t) = \cos(t) = \boxed{-\frac{3}{4}}$

b) $\sec(-t) = \sec(t) = \frac{1}{\cos(t)} = \boxed{-\frac{4}{3}}$