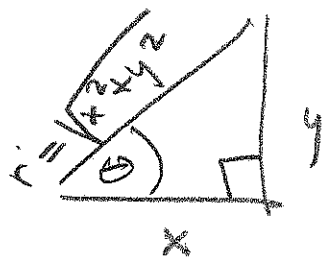
122 S1.4 #s 1-8 All, 9-97!?

#s 1-6, Use the triangle.



(1) $\sin\theta = \frac{y}{r}$

(2) $\frac{r}{y} = \csc\theta$

(3) $\tan\theta = \frac{y}{x}$

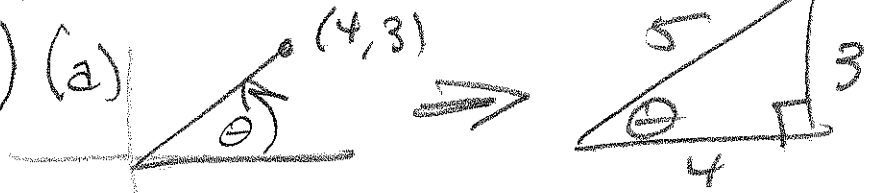
(4) $\sec\theta = \frac{r}{x}$ (5) $\frac{x}{r} = \cos\theta$ (6) $\frac{x}{y} = \cot\theta$

(7) Because $r = \sqrt{x^2+y^2}$ can't be ZERO, the sine & cosine functions are defined $\forall \theta \in \mathbb{R}$
↳ ∃, real, ...

(8) The acute positive angle formed by the terminal side & the x-axis is called the reference angle, denoted by θ' (or α)
Ref Angle always is acute, so all of trig is about QI and pictures...

#s 9-12 Find EXACT value of 6 trig's.

(9) (a)

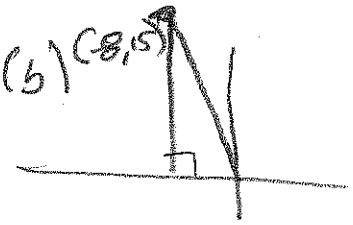


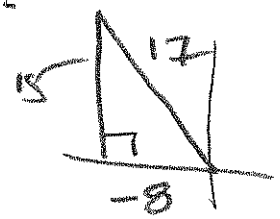
$\sin\theta = \frac{3}{5}$, $\cos\theta = \frac{4}{5}$, $\tan\theta = \frac{3}{4}$

$\csc\theta = \frac{5}{3}$, $\sec\theta = \frac{5}{4}$, $\cot\theta = \frac{4}{3}$

122 §1.4 #s 9–97 !?

(9) (b) (8, 15)





$8^2 + 15^2 = 289$

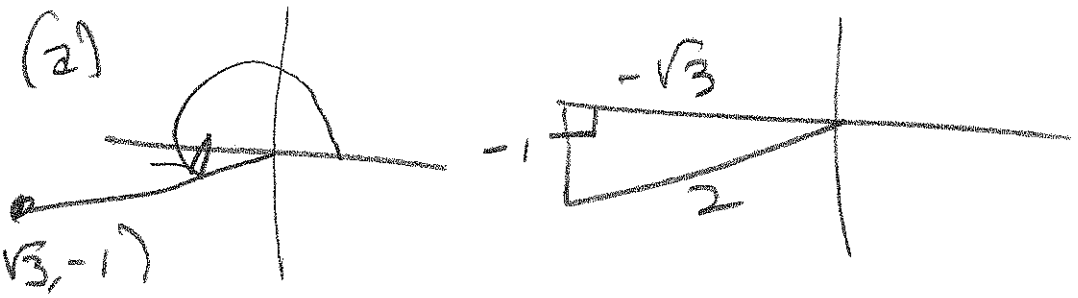
$\sqrt{289} = 17$

$\sin\theta = \frac{15}{17}$ $\quad \csc\theta = \frac{17}{15}$

$\cos\theta = -\frac{8}{17}$ $\quad \sec\theta = -\frac{17}{8}$

$\tan\theta = -\frac{15}{8}$ $\quad \cot\theta = -\frac{8}{15}$

(11) (2)



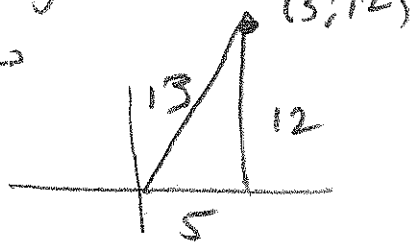
$\sin\theta = -\frac{1}{2}$ $\quad \csc\theta = -2$

$\cos\theta = -\frac{\sqrt{3}}{2}$ $\quad \sec\theta = -\frac{2}{\sqrt{3}}$

$\tan\theta = \frac{1}{\sqrt{3}}$ $\quad \cot\theta = \sqrt{3}$

(12) #s 13–18. The pt is on the terminal side of an angle in std position. Find 6 things, exactly.

(13) (5, 12)



$25 + 144 = 169$

$\sqrt{169} = 13$

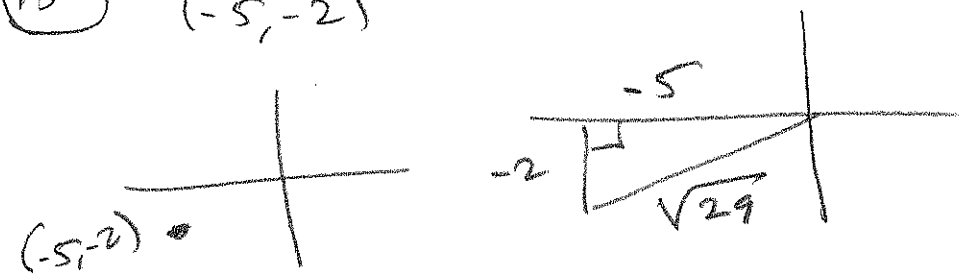
$\sin\theta = \frac{12}{13}$ $\quad \csc\theta = \frac{13}{12}$

$\cos\theta = 5/13$ $\quad \sec\theta = 13/5$

$\tan\theta = \frac{12}{5}$ $\quad \cot\theta = \frac{5}{12}$

122 §1.4 #s 15-97 !?

(15) $(-5,-2)$



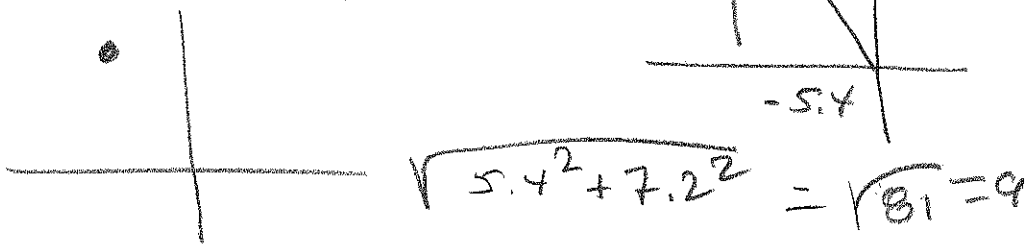
$4+25=29$

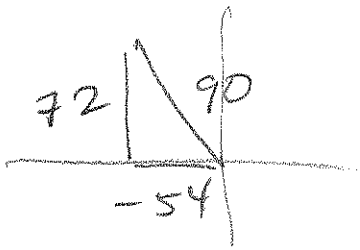
$\sin\theta = -\frac{2}{\sqrt{29}}$ $\quad \csc\theta = -\frac{\sqrt{29}}{2}$

$\cos\theta = -\frac{5}{\sqrt{29}}$ $\quad \sec\theta = -\frac{\sqrt{29}}{5}$

$\tan\theta = \frac{2}{5}$ $\quad \cot\theta = \frac{5}{2}$

(17) $(-5.4, 7.2)$





$\sqrt{5.4^2+7.2^2} = \sqrt{81} = 9$

$\sin\theta = \frac{72}{90} = \frac{8}{10} = \frac{4}{5}$ $\quad \csc\theta = \frac{5}{4}$

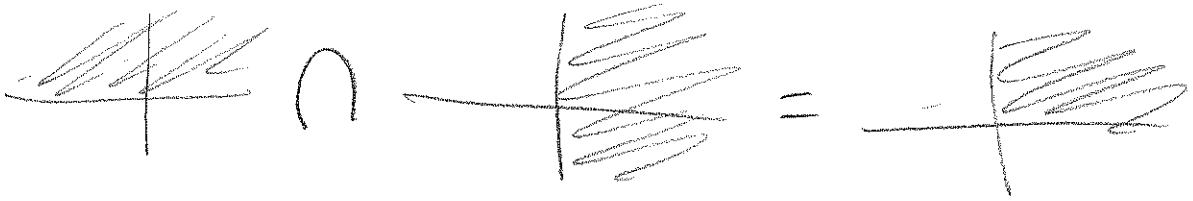
$\cos\theta = -\frac{54}{90} = -\frac{6}{10} = -\frac{3}{5}$ $\quad \sec\theta = -\frac{5}{3}$

$\tan\theta = \frac{72}{54} = -\frac{8}{6} = -\frac{4}{3}$ $\quad \cot\theta = -\frac{3}{4}$

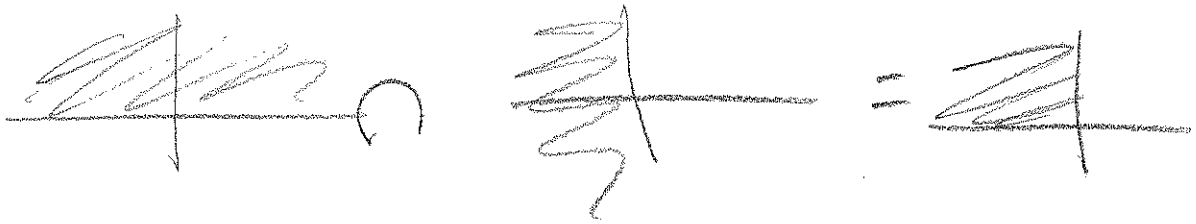
122 §1.4 #s 19-97!?

#s 19-22 Determine the quadrant in which the terminal side lies.

(19) $\sin\theta > 0$ & $\cos\theta > 0$ QI

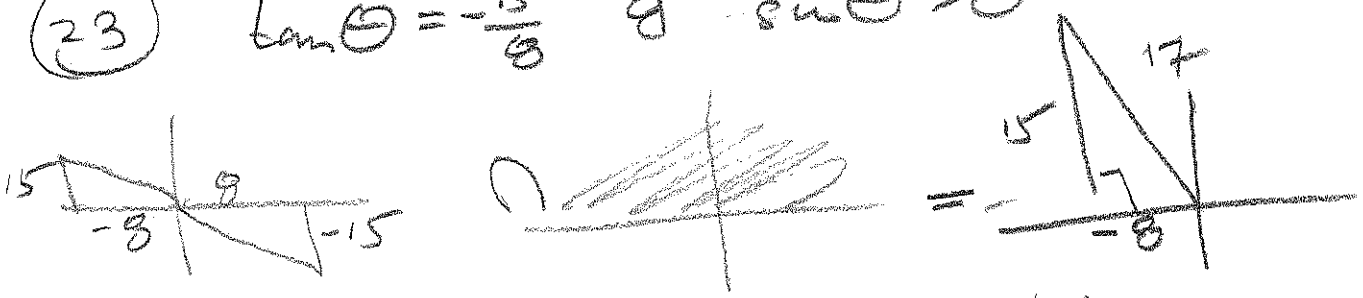


(21) $\sin\theta > 0$ & $\cos\theta < 0$ QII



#s 23-32 Find 6 trigs, given the constraints.

(23) $\tan\theta = -\frac{15}{8}$ & $\sin\theta > 0$



$\alpha + 225^\circ = 270^\circ$

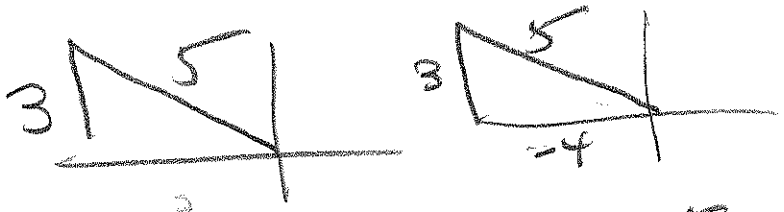
$\sin\theta = \frac{15}{17}$ $\quad \csc\theta = \frac{17}{15}$

$\cos\theta = -\frac{8}{17}$ $\quad \sec\theta = -\frac{17}{8}$

$\tan\theta = -\frac{15}{8}$ $\quad \cot\theta = -\frac{8}{15}$

122 § 1.4 #s 25-97 !?

(25) $\sin\theta = \frac{3}{5}$ QII

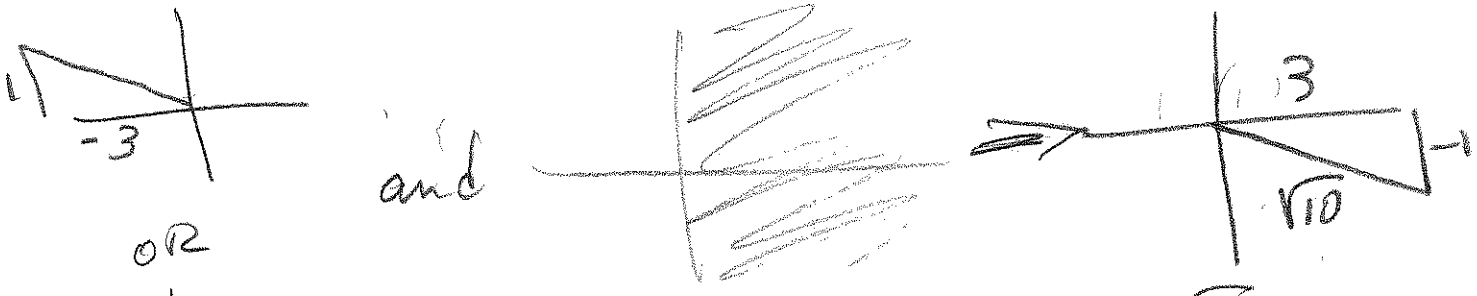


$\sin\theta = \frac{3}{5}$ $\quad \csc\theta = \frac{5}{3}$

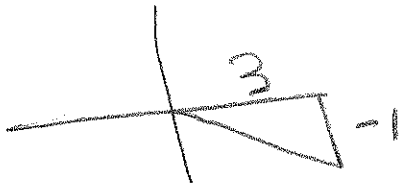
$\cos\theta = -\frac{4}{5}$ $\quad \sec\theta = -\frac{5}{4}$

$\tan\theta = -\frac{3}{4}$ $\quad \cot\theta = -\frac{4}{3}$

(27) $\cot\theta = -3$ & $\cos\theta > 0$



OR



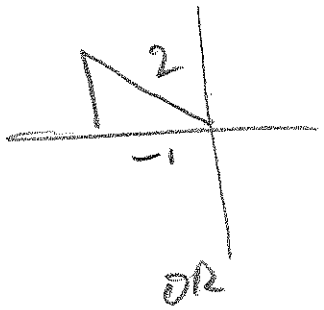
$\sin\theta = -\frac{1}{\sqrt{10}}$ $\quad \csc\theta = -\sqrt{10}$

$\cos\theta = \frac{3}{\sqrt{10}}$ $\quad \sec\theta = \frac{\sqrt{10}}{3}$

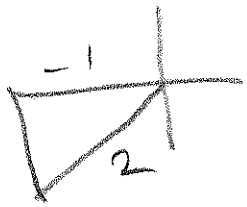
$\tan\theta = -\frac{1}{3}$ $\quad \cot\theta = -3$

122 SOME #s 29-97!?

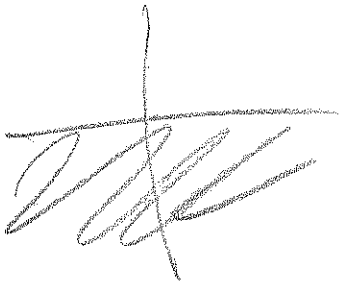
(29) $\sec\theta = -2$ AND $\sin\theta < 0$



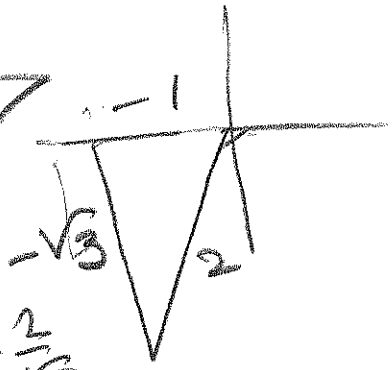
OR



AND



$\Rightarrow$

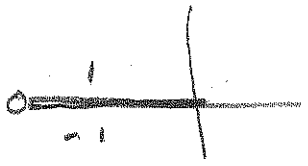


$\sin\theta = -\frac{\sqrt{3}}{2}$ $\quad \csc\theta = -\frac{2}{\sqrt{3}}$

$\cos\theta = -\frac{1}{2}$ $\quad \sec\theta = -2$

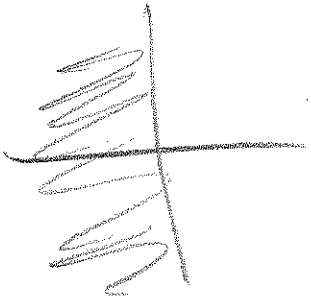
$\tan\theta = \sqrt{3}$ $\quad \cot\theta = \frac{1}{\sqrt{3}}$

(31) $\cot\theta$ ~~$\nexists$~~ and $\frac{\pi}{2} \le \theta \le \frac{3\pi}{2}$

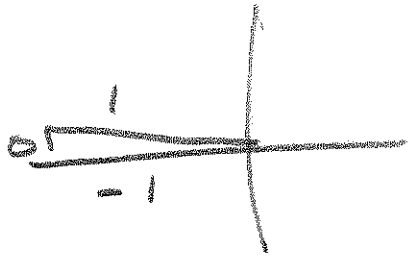


OR

AND



$\Rightarrow$



$\sin\theta = 0$ $\quad \csc\theta$ ~~$\nexists$~~

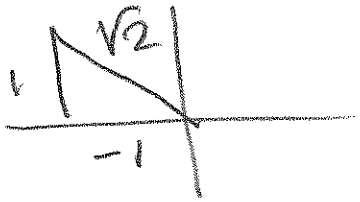
$\cos\theta = -1$ $\quad \sec\theta = -1$

$\tan\theta = 0$ $\quad \cot\theta$ ~~$\nexists$~~

122 § 1.4 #s 33-97!?

#s 33-36 Terminal Side lies on given line in specified quad. Find 6 trigs!

(33) $y = -x$ QII



$\sin\theta = \frac{1}{\sqrt{2}}$ $\quad \csc\theta = \sqrt{2}$

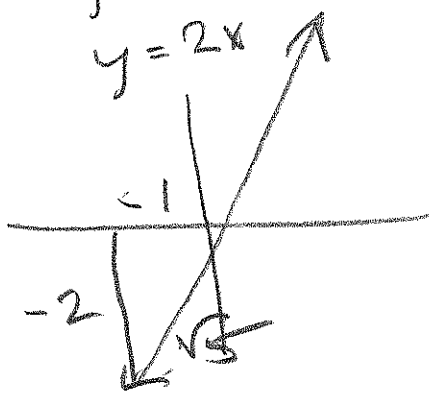
$\cos\theta = -\frac{1}{\sqrt{2}}$ $\quad \sec\theta = -\sqrt{2}$

$\tan\theta = -1$ $\quad \cot\theta = -1$

(35) $2x - y = 0$ QIII

$-y = -2x$

$y = 2x$



$\sin\theta = -\frac{2}{\sqrt{5}}$ $\quad \csc\theta = -\frac{\sqrt{5}}{2}$

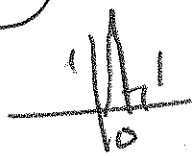
$\cos\theta = -\frac{1}{\sqrt{5}}$ $\quad \sec\theta = -\sqrt{5}$

$\tan\theta = 2$ $\quad \cot\theta = \frac{1}{2}$

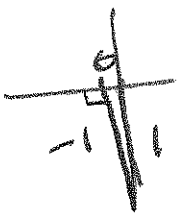
#s 37-44 Find ~~5~~ trigs

(37) $\sin\pi = 0$

(41) $\sin\frac{\pi}{2} = 1$



(39) $\sec\frac{3\pi}{2}$ ~~= 1~~



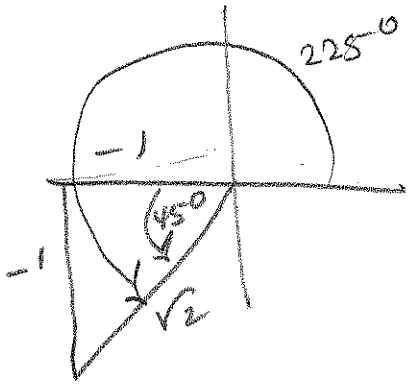
(43) $\csc\pi$

$\csc\pi$

122 §1.5 #s 53-97!?

#s 53-68 Evaluate w/o a calculator
↳ sine, cosine, tangent

(53) $\theta = 225^\circ$

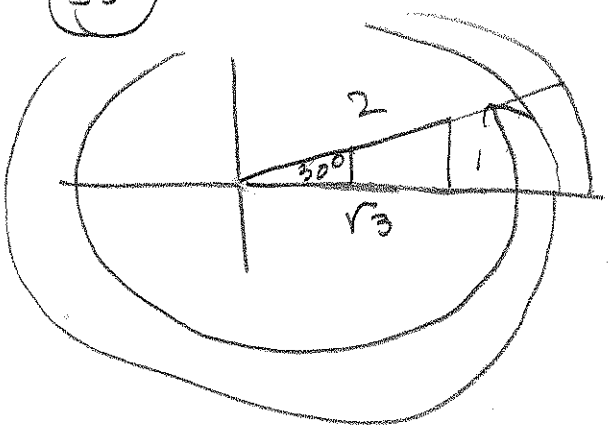


$\sin\theta = -\frac{1}{\sqrt{2}}$

$\cos\theta = -\frac{1}{\sqrt{2}}$

$\tan\theta = 1$

(55) $\theta = 750^\circ$



$\frac{750}{360} = 2 + \frac{30}{360}$

$750 = 2(360) + 30 \rightarrow 30^\circ$
↳ twice around

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

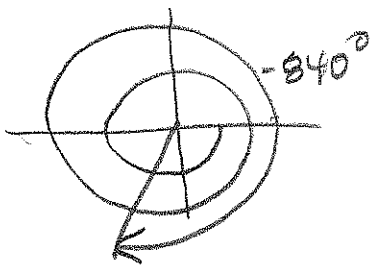
$\cos\theta = \frac{\sqrt{3}}{2}$

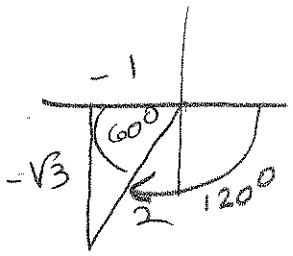
$\tan\theta = \frac{1}{\sqrt{3}}$

(57) -840°

$\frac{840}{360} = 2 + \frac{120}{360}$

$840^\circ = 2(360) + 120$





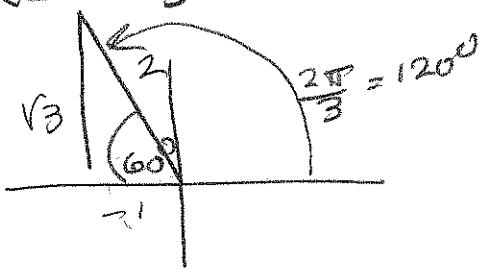
$\sin\theta = -\frac{\sqrt{3}}{2}$

$\cos\theta = -\frac{1}{2}$

$\tan\theta = \sqrt{3}$

122 § 1.4 #s 59–97

(59) $\frac{2\pi}{3} = 120^0$

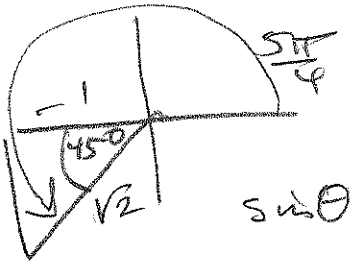


$\sin\theta = \frac{\sqrt{3}}{2}$

$\cos\theta = -\frac{1}{2}$

$\tan\theta = -\sqrt{3}$

(61) $\theta = \frac{5\pi}{4} = 225^0$

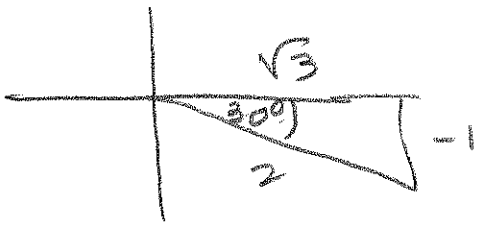


$\sin\theta = -\frac{1}{\sqrt{2}}$

$\cos\theta = -\frac{1}{\sqrt{2}}$

$\tan\theta = 1$

(63) $-\frac{\pi}{6}$

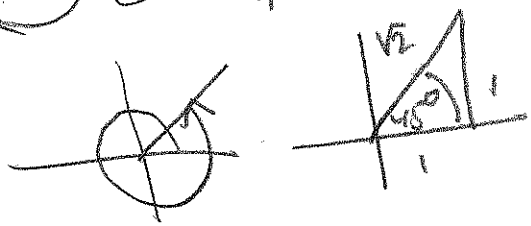


$\sin\theta = -\frac{1}{2}$

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

$\tan\theta = -\frac{1}{\sqrt{3}}$

(65) $\theta = \frac{9\pi}{4} = 405^0$

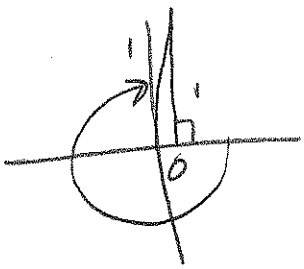


$\sin\theta = \frac{1}{\sqrt{2}}$

$\cos\theta = \frac{1}{\sqrt{2}}$

$\tan\theta = 1$

(67) $-\frac{3\pi}{2} = -270^0$



$\sin\theta = 1$

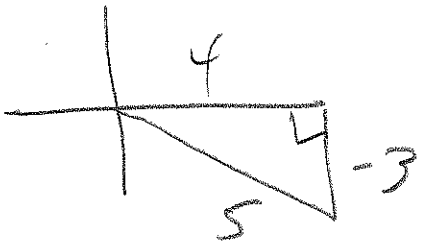
$\cos\theta = 0$

$\tan\theta$ ∄

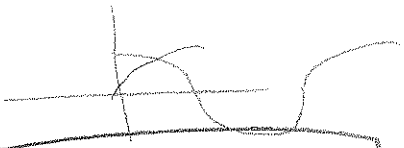
122 §1.4 #s 69-97

(69) #s 69-74 Use trig id. to find the indicated value in specified quadrant.

(69) $\sin\theta = -\frac{3}{5}$ QIV $\Rightarrow$ $\cos\theta = \frac{4}{5}$

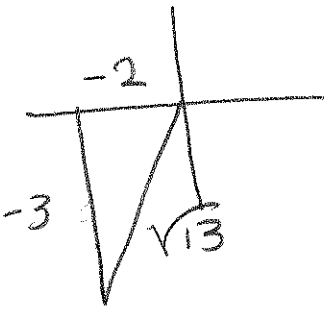


Trig ident?

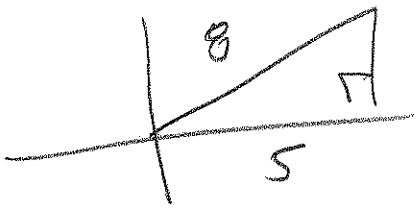


(71) $\tan\theta = \frac{3}{2}$ QIII $\Rightarrow$ $\sec\theta = -\frac{2}{\sqrt{13}}$

$4+9=13$



(73) $\cos\theta = \frac{5}{8}$ QI $\Rightarrow$ $\sec\theta = \frac{8}{5}$



'22 Sln #s 75-97

#s 75-90 use a calculator to evaluate the trig. func. Round to 4 places.

(75) $\sin(10°) \approx .1736$

(77) $\cos(-110°) \approx -.3420$

(79) $\tan(304°) \approx -1.4826$

(81) $\sec(72°) \approx 3.2361$

(83) $\tan(4.5) \approx 4.6373$

(85) $\tan\left(\frac{\pi}{9}\right) \approx .3640$

(87) $\sin(-.65) \approx .6052$

(89) $\cot\left(-\frac{11\pi}{8}\right) \approx -.4142$

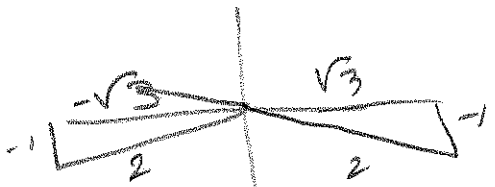
#s 91-96 Find 2 solns, in degrees & radians

(91) (a) $\sin\theta = +\frac{1}{2}$

$\theta = \frac{\pi}{6}, 30°$

$\theta = \frac{5\pi}{6}, 150°$

(b) $\sin\theta = +\frac{1}{2}$

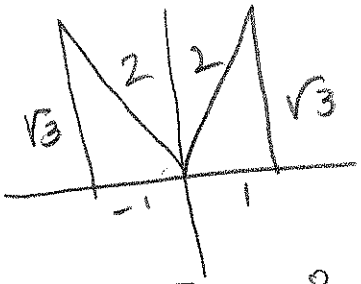


$\theta = \pi + \frac{\pi}{6} = \frac{7\pi}{6}, 210°$

$\theta = 2\pi - \frac{\pi}{6} = \frac{11\pi}{6}, 330°$

122 §1.4 #s 93-97

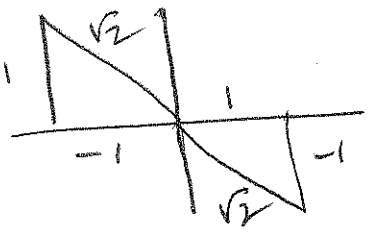
(93) (a) $\csc\theta = \frac{2\sqrt{3}}{3} = \frac{2}{\sqrt{3}}$



$\theta = \frac{\pi}{3} = 60^\circ$

$\theta = \frac{2\pi}{3} = 120^\circ$

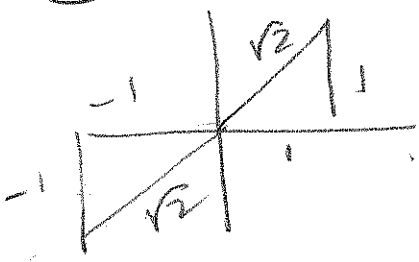
(b) $\cot\theta = -1$



$\theta = \frac{3\pi}{4} = 135^\circ$

$\theta = \frac{7\pi}{4} = 315^\circ$

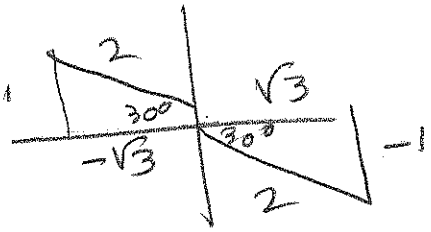
(95) (a) $\tan\theta = 1$



$\theta = \frac{\pi}{4} = 45^\circ$

$\theta = \frac{5\pi}{4} = 225^\circ$

(b) $\cot\theta = -\sqrt{3}$

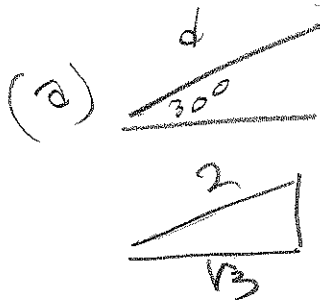


$\theta = \frac{5\pi}{6} = 150^\circ$

$\theta = \frac{11\pi}{6} = 330^\circ$

(97) Plane's height is 6 mi. θ = angle of elevation from observer to plane. Find distance d to the plane when (a) $\theta = 30^\circ$, (b) $\theta = 90^\circ$, (c) $\theta = 120^\circ$

(a)



$\frac{6}{d} = \sin 30^\circ$

$\frac{6}{\sin 30^\circ} = d$

$d = 6\csc 30^\circ$

$= 6(2) =$ **12 mi**

(b) $d = 6\csc 90^\circ$

$=$ **6 mi**

(c) $d = 6\csc 120^\circ$

$= 6 \cdot \frac{2}{\sqrt{3}} = \frac{12}{\sqrt{3}}$ mi

$\approx$ **6.9282 mi**