10) $\frac{1}{\sin x - 1} + \frac{1}{\sin x + 1} = -2\tan x \sec x$

$\frac{(\sin x+1)}{(\sin x+1)(\sin x-1)} \cdot 1 + 1 \cdot \frac{(\sin x-1)}{(\sin x+1)(\sin x-1)}$

$\frac{\sin x + 1 + \sin x - 1}{\sin^2 x - 1}$

$\frac{2\sin x}{\sin^2 x - 1}$

$\frac{-1}{-1} \cdot \frac{2\sin x}{\sin^2 x - 1}$

$\frac{-2\sin x}{1 - \sin^2 x}$

Think $\cos^2\theta + \sin^2\theta = 1$, $\cos^2\theta = 1 - \sin^2\theta$

$\frac{-2\sin x}{\cos^2 x}$

Think $\cos^2 x = (\cos x)(\cos x)$

$= -2 \frac{\sin x}{\cos x} \cdot \frac{1}{\cos x}$

Think $\tan x = \frac{\sin x}{\cos x}$

$= -2\tan x \cdot \sec x$

Think $\frac{1}{y-1} + \frac{1}{y+1}$

$(y+1)\frac{1}{(y+1)(y-1)} + \frac{1}{y+1}(y-1)$

$\frac{y+1+y-1}{y^2-1}$

$\frac{2y}{y^2-1}$

$\frac{-1}{-1} \cdot \frac{2y}{y^2-1}$

$\frac{-2y}{1-y^2}$

Think $x^2 + y^2 = 1$, $x^2 = 1 - y^2$

$= \frac{-2y}{x^2}$

$= \frac{-2y}{x} \cdot \frac{1}{x}$

Review I

2) $1 - \frac{\sin^2\theta}{1+\cos\theta} = \cos\theta$

x

$1 - \frac{y^2}{1+x}$

$\frac{(1+x)}{(1+x)}\frac{1}{1} - \frac{y^2}{1+x}$

$\frac{1+x-y^2}{x+1}$ → $x^2+y^2=1$, $y^2=1-x^2$

$\frac{1+x-(1-x^2)}{x+1}$

$\frac{1+x-1+x^2}{x+1}$

$\frac{x^2+x}{x+1}$

$\frac{x(x+1)}{(x+1)}$

x

$\cos\theta = \cos\theta$ ✓

3)

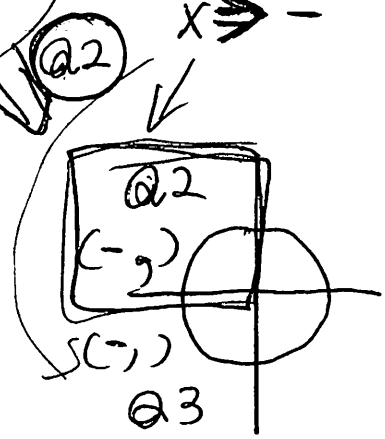
$\sin\theta = \frac{6}{7}$ (6 → opp, 7 → hyp)

Find $\sec\theta$

$\sec\theta = \frac{hyp}{adj.}$

$\cos\theta < 0$

$x \Rightarrow -$



$6^2 + x^2 = 7^2$

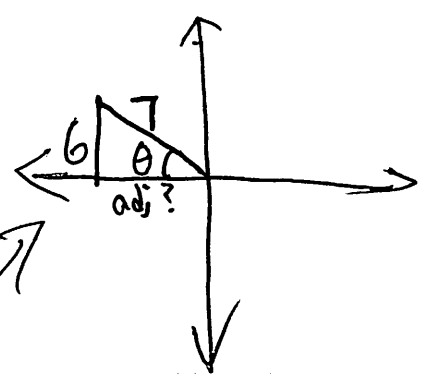
$6^2 + x^2 = 7^2$

$36 + x^2 = 49$

$x^2 = 13$

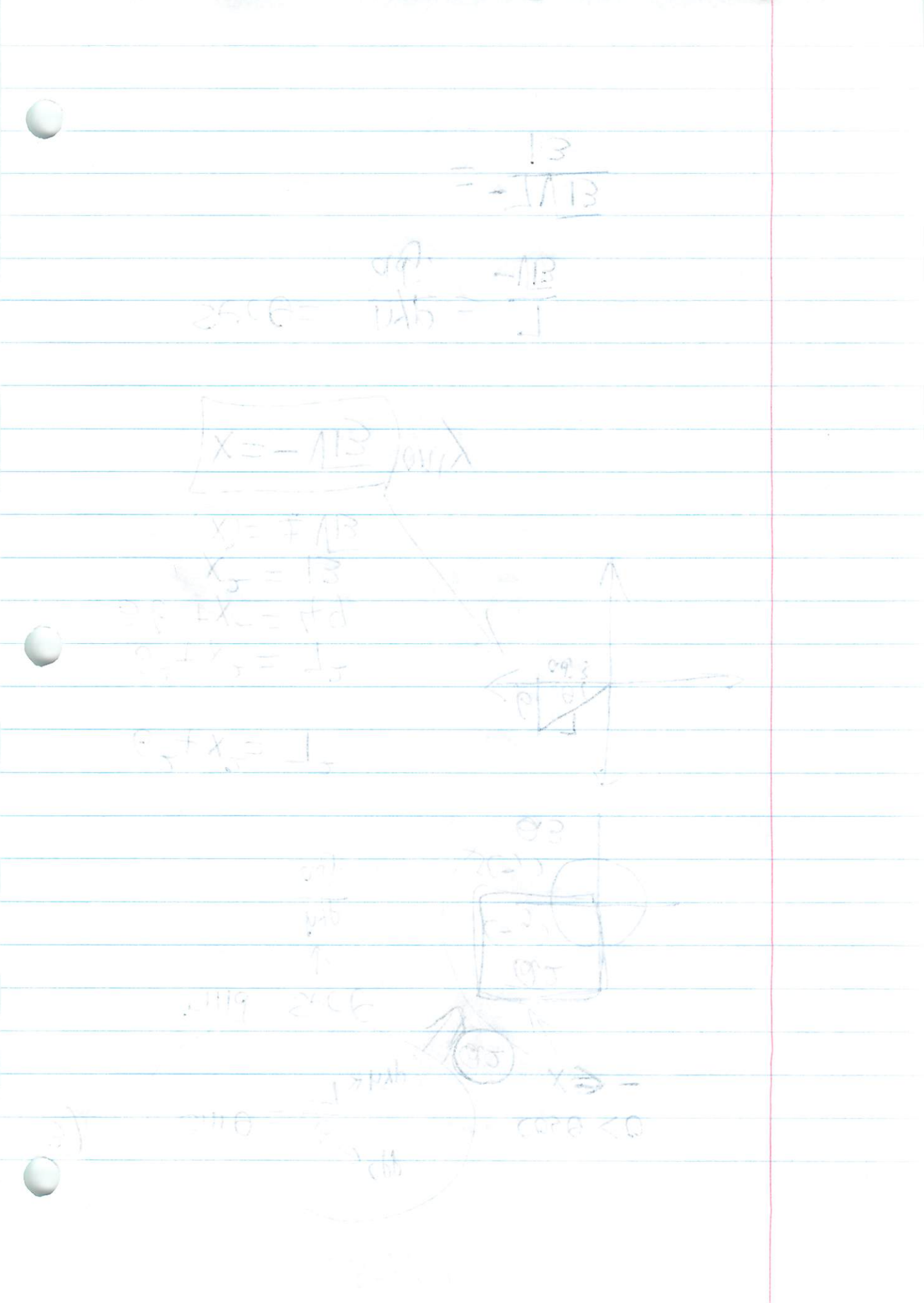
$x = \pm\sqrt{13}$

$\boxed{x = -\sqrt{13}}$ only



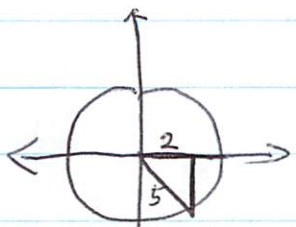
$\sec\theta = \frac{hyp}{adj.} = \frac{7}{-\sqrt{13}}$

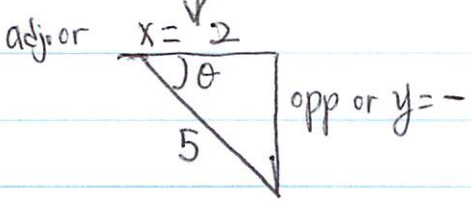
$= \frac{-7\sqrt{13}}{13}$

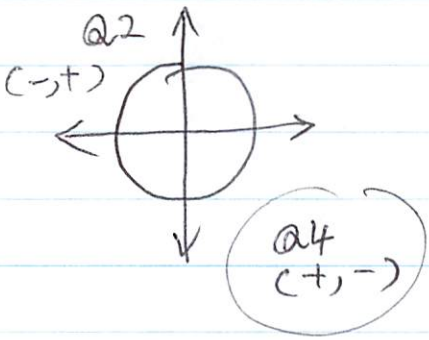


4) $\cos\theta = \frac{2}{5}$ (A over h), $\tan\theta < 0$

Think: what quadrant is $\tan\theta = -\frac{y}{x}$







$2^2 + y^2 = 5^2$

$4 + y^2 = 25$

$y^2 = 25 - 4$

$y^2 = 21$

$y = \pm\sqrt{21}$

but y has to be (-).

$y = -\sqrt{21}$

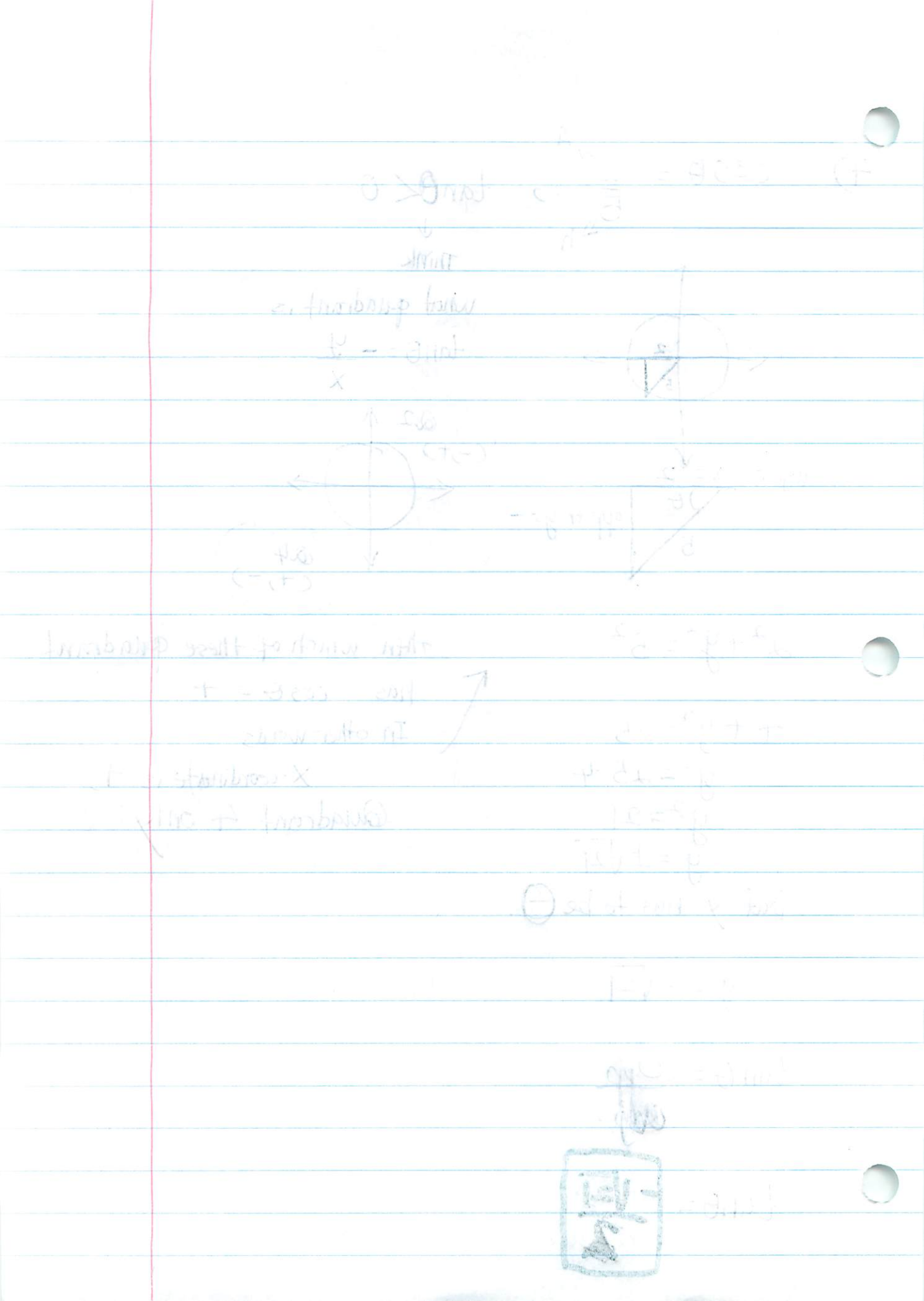
then which of these quadrant has $\cos\theta = +$

In other words x-coordinate is +,

Quadrant 4 only

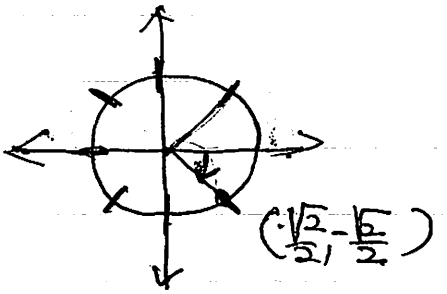
$\tan\theta = \frac{Opp}{Adj}$

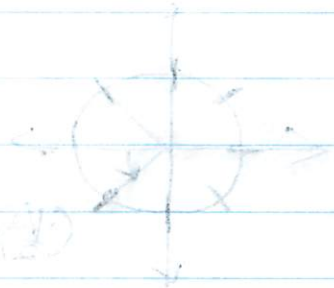
$\tan\theta = -\frac{\sqrt{21}}{2}$



5) $\sin \frac{7\pi}{4}$

$\boxed{-\frac{\sqrt{2}}{2}}$





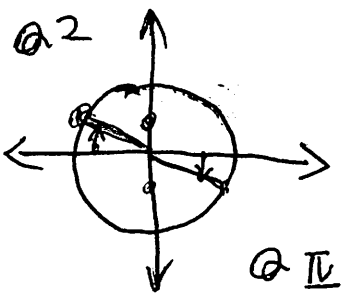
7) $\tan^{-1}\left(-\frac{\sqrt{3}}{3}\right)$

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

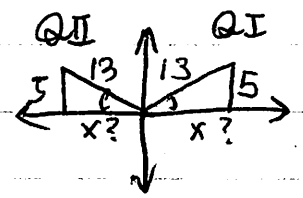
$\tan^{-1}\left(\frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}}\right)$ or $\tan^{-1}\left(\frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}}\right)$

$\theta = 150°$ or $330°$

$\theta = \frac{5\pi}{6}$ or $\frac{11\pi}{6}$



9) $\tan\left(\sin^{-1}\frac{5}{13}\right)$



$5^2 + x^2 = 13^2$

$25 + x^2 = 169$

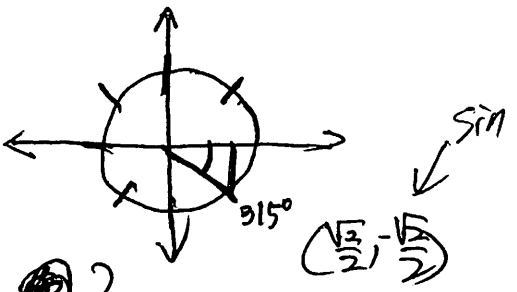
$x^2 = 144$

$x = \pm 12$

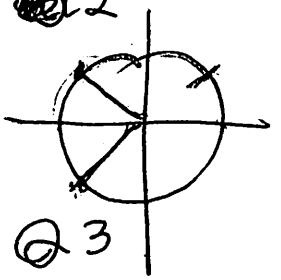
$\tan\theta = \frac{5}{12}$ or $\tan\theta = \frac{+5}{-12}$

10) $\cos^{-1}\left(\sin\left(\frac{7\pi}{4}\right)\right)$

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



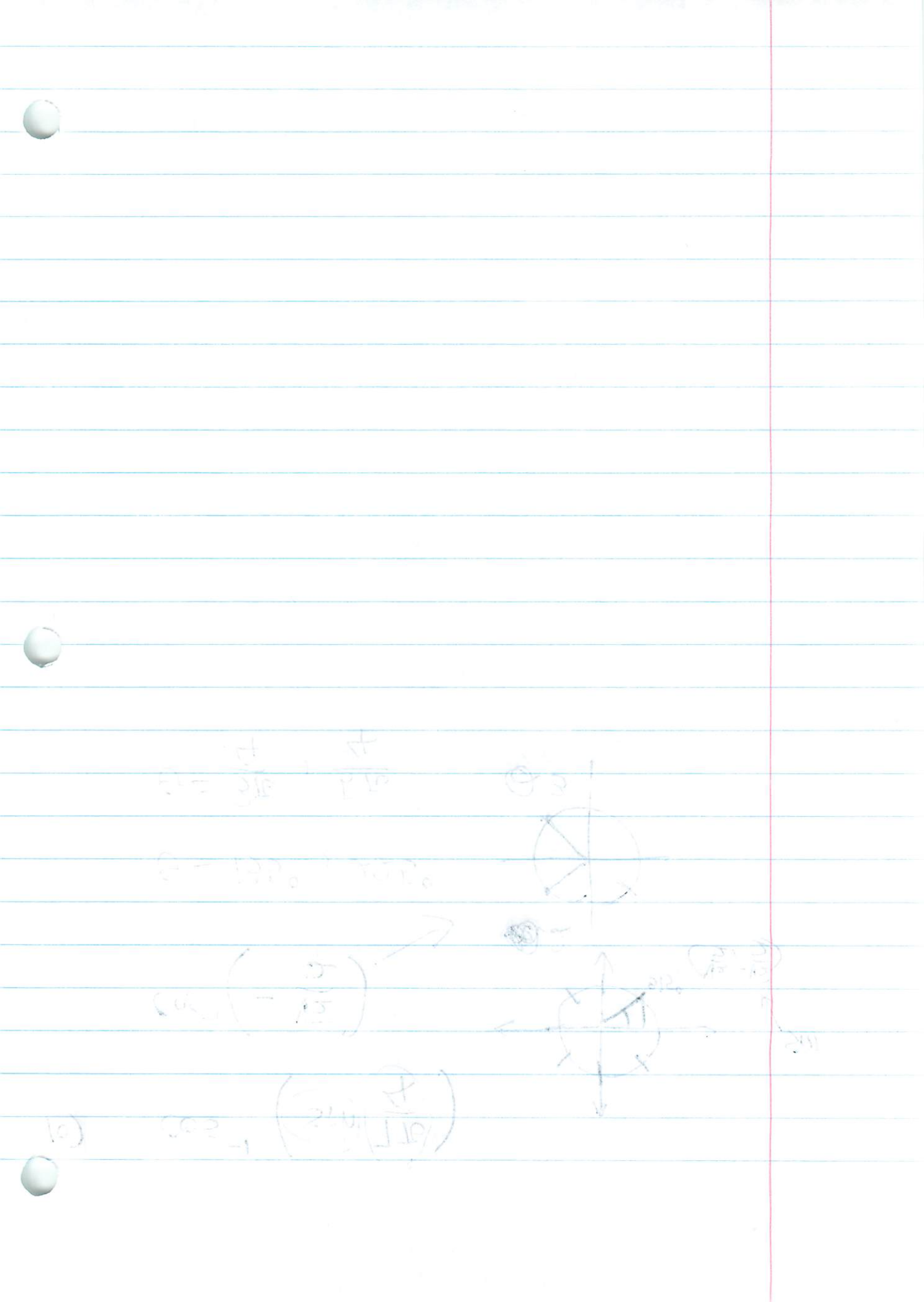
Q2



Q3

$\theta = 135°, 225°$

$\theta = \frac{3\pi}{4}, \frac{5\pi}{4}$



11) $6\tan x = 3\tan x - \sqrt{3}$

$-3\tan x \quad -3\tan x$

$\frac{3\tan x}{3} = \frac{-\sqrt{3}}{3}$

$\tan x = -\frac{\sqrt{3}}{3}$

$x = \tan^{-1} -\frac{\sqrt{3}}{3}$

↓ Think!

$6g = 3g - \sqrt{3}$

$-3g \quad -3g$

$\frac{3g}{3} = \frac{-\sqrt{3}}{3}$

$g = -\frac{\sqrt{3}}{3}$

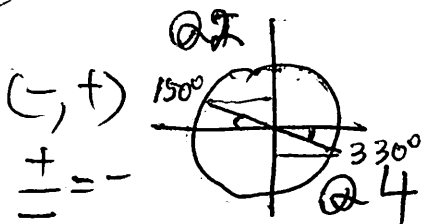
↓

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

$x = 150^\circ$ or 330°

$x = \frac{5\pi}{6}$ or $\frac{11\pi}{6}$

$-\frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}}$ or $\frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}}$



(−, +)

$\frac{+}{-} = -$

(+, −)

$\frac{-}{+} = -$

13) $7\tan^2 x - 4 = 10\tan^2 x - 5$

$-7\tan^2 x \qquad -7\tan^2 x$

Think!

$7m^2 - 4 = 10m^2 - 5$

$-7m^2 \qquad -7m^2$

$-4 = 3m^2 - 5$

$+5 \qquad +5$

$\frac{1}{3} = \frac{3m^2}{3}$

$\frac{1}{3} = m^2$

$-4 = 3\tan^2 x - 5$

$+5 \qquad +5$

$\frac{1}{3} = \frac{3\tan^2 x}{3}$

$\sqrt{\frac{1}{3}} = \sqrt{\tan^2 x}$

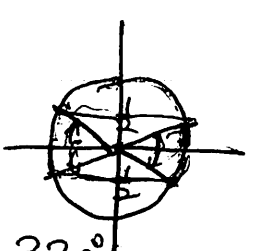
$\pm\sqrt{\frac{1}{3}} = \tan x$

$\pm\frac{1}{\sqrt{3}} = \tan x$

$\pm\frac{\sqrt{3}}{3} = \tan x$

$\tan^{-1}\pm\frac{1}{\sqrt{3}} = x$

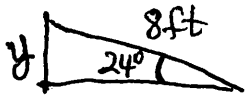
$\tan^{-1}\frac{\frac{1}{2}}{\pm\frac{\sqrt{3}}{2}} = x$



$x = 30°, 150°, 210°, 330°$

$x = \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6}$

15)



$S = \frac{o}{h}$

$\sin 24 = \frac{y}{8}$

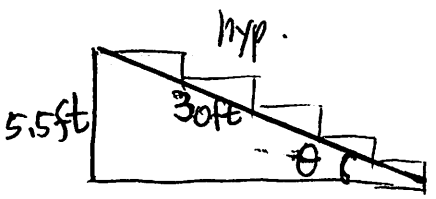
$\frac{0.4067}{1} \approx \frac{y}{8}$

$y \approx 8(0.4067)$

$y \approx 3.25$

$\boxed{3.25 \text{ ft}}$

17)



opp.

$S = \frac{o}{h}$

$\sin\theta = \frac{5.5}{30}$

$\theta = \sin^{-1}\left(\frac{5.5}{30}\right)$

$\theta \approx \boxed{10.56^\circ}$

$\theta \approx 11^\circ$ → rounded to nearest degree