

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

$$\frac{(\sin x + 1)}{(\sin x + 1)(\sin x - 1)} + \frac{1}{(\sin x + 1)(\sin x - 1)} \quad \text{Think} \downarrow \quad \frac{(y+1)}{(y+1)y-1} + \frac{1}{y+1(y-1)}$$

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

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

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

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

$$\text{Think} \swarrow \quad \frac{-2 \sin x}{\cos^2 x} \quad \begin{matrix} \cos^2 x = 1 - \sin^2 x \\ \cos^2 x = 1 - \sin^2 x \end{matrix}$$

$$\text{Think} \swarrow \quad \frac{-2 \sin x}{\cos x} \cdot \frac{1}{\cos x} \quad \begin{matrix} \cos^2 x = (\cos x)(\cos x) \\ \cos^2 x = (\cos x)(\cos x) \end{matrix}$$

$$\text{Think} \swarrow \quad \frac{-2 \sin x}{\cos x} \cdot \frac{1}{\cos x} = -2 \tan x \sec x$$

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

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

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

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

$$= \frac{-2y}{x^2} \quad \text{Think} \quad \begin{matrix} x^2 + y^2 = 1 \\ x^2 = 1 - y^2 \end{matrix}$$

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

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

Review I

2)

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

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

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

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

$$\rightarrow \begin{aligned} x^2 + y^2 &= 1 \\ y^2 &= 1 - x^2 \end{aligned}$$

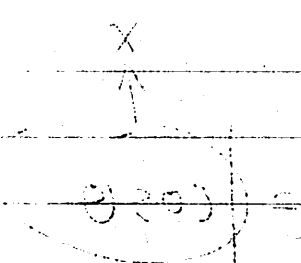
$$\frac{1+x - (1-x^2)}{x+1}$$

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

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

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

$$\cos \theta = \cos \theta \quad \checkmark$$



1. W91037

$$\frac{0.30}{1} = \frac{0.30}{0.003+1} \quad (2)$$

$$\frac{0.30}{x+1} = 1$$

$$\frac{0.30}{x+1} = 1 \quad (1)$$

$$0.30 = x+1$$

$$\frac{0.30}{x+1} = 1$$

$$\frac{(0.30 - 1) - x + 1}{1+x}$$

$$\frac{0.30 + 1 - x + 1}{1+x}$$

$$\frac{(0.30 + 1) - x + 1}{1+x}$$

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

x

$$\checkmark 0.30 = 0.30$$

3)

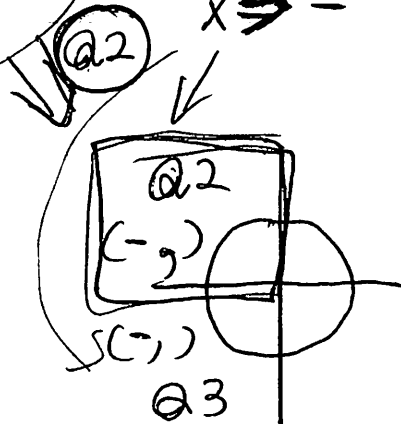
$$\sin \theta = \frac{6}{7} \begin{matrix} \rightarrow \text{opp} \\ \rightarrow \text{hyp} \end{matrix}$$

$$\cos \theta < 0$$

$$x \Rightarrow -$$

Find $\sec \theta$

$\downarrow$
hyp
adj.



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

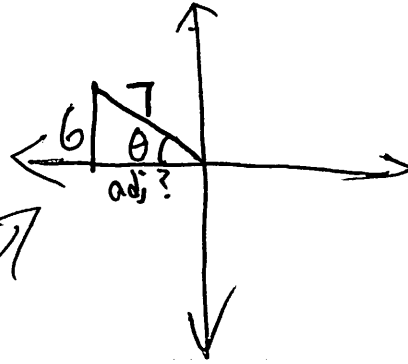
$$6^2 + x^2 = 7^2$$

$$36 + x^2 = 49$$

$$x^2 = 13$$

$$x = \pm \sqrt{13}$$

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



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

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

$$= \frac{13}{-1/13}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{-13}{1}$$

$$X = -13$$

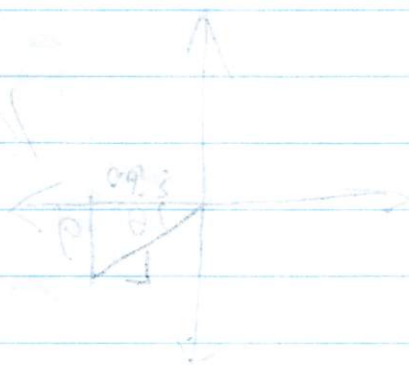
$$X_1 = 7/13$$

$$X_2 = 13$$

$$\text{op} \pm X_1 = \pm d$$

$$\text{op} \pm X_2 = \pm d$$

$$\theta_1 + X_1 = 1$$



$$\cos \theta = \frac{\text{adj}}{\text{hyp}}$$

$$\cos \theta = \frac{1}{2.1}$$

$$X = -$$

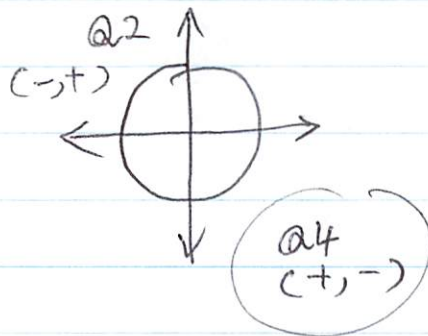
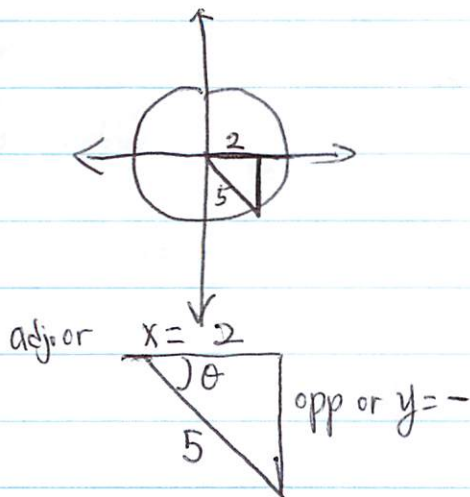
$$\cos \theta < 0$$

4) $\cos \theta = \frac{2}{5}$ ^{→ A}
_{↘ 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 $\ominus$.

$$y = -\sqrt{21}$$

$$\tan \theta = \frac{\text{Opp}}{\text{adj}}$$

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

then which of these quadrant

has $\cos \theta = +$

In other words

X-coordinate is +,

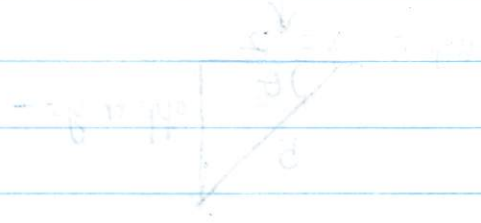
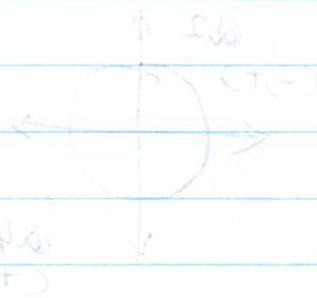
Quadrant 4 only

$$0 > \theta_{\text{rad}}$$

thrust

in, through body

$$\frac{v}{x} = \frac{3 \text{ m/s}}{1 \text{ m}}$$



In, through body

$$x = -3 \text{ m/s}$$

in, through body

in, through body

in, through body

$$x = -3 \text{ m/s}$$

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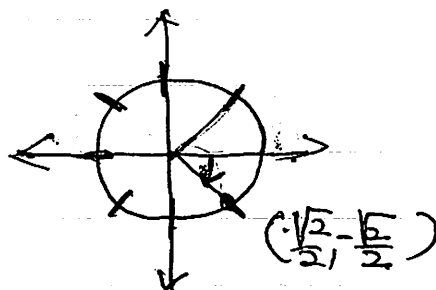
$$x = -3 \text{ m/s}$$

$$x = -3 \text{ m/s}$$



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

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





at me Co
+



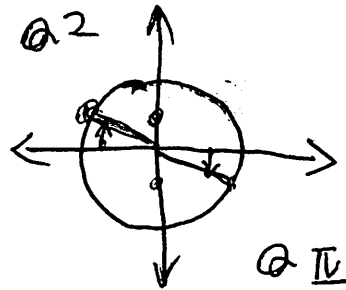
$$7) \tan^{-1} \left(-\frac{\sqrt{3}}{3} \right)$$

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

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

$$\theta = 150^\circ \text{ or } 330^\circ$$

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



$$\begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}$$

$$\begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$$

$$\begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} = \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} \quad \text{or} \quad \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix} = \begin{pmatrix} \cos \theta \\ \sin \theta \end{pmatrix}$$



$$\theta = 120^\circ \text{ or } 240^\circ$$

$$\theta = 210^\circ \text{ or } 330^\circ$$

9)

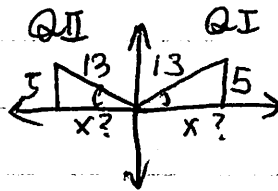
$$\tan \left(\sin^{-1} \frac{5}{13} \right)$$

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

$$25 + x^2 = 169$$

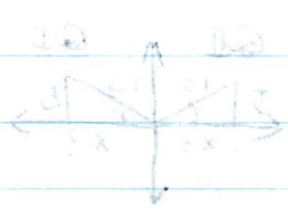
$$x^2 = 144$$

$$x = \pm 12$$



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

$$\begin{pmatrix} 2 & 4 \\ 1 & 1 \end{pmatrix} \rightarrow (1)$$



$$\begin{aligned} \vec{e}_1 &= \vec{x} + \vec{y} \\ \vec{e}_2 &= \vec{x} + 2\vec{y} \\ \vec{y} &= \vec{x} \\ \vec{z} &= \vec{x} \end{aligned}$$

$$\frac{\vec{e}_1}{\vec{e}_2} = \frac{\vec{x} + \vec{y}}{\vec{x} + 2\vec{y}} \rightarrow \frac{\vec{e}_1}{\vec{e}_2} = \frac{1}{2}$$

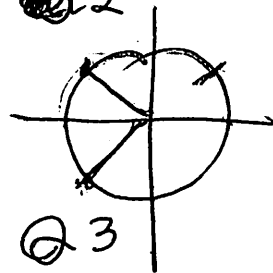
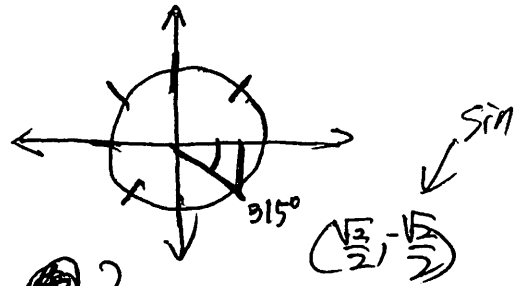
10)

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

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

$$\theta = 135^\circ, 225^\circ$$

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

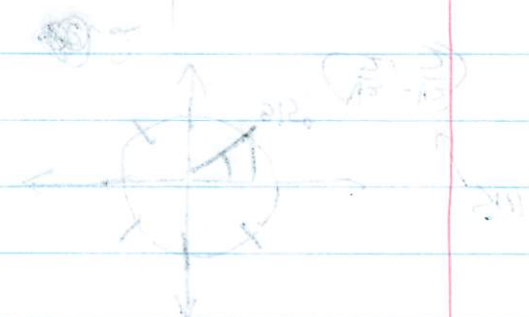


$$E = \frac{1}{2} \frac{q^2}{r^2} + \frac{1}{2} \frac{q^2}{r^2}$$

$$E = 127.0 \text{ } 10^3 \text{ } 10^3$$



$$\cos \left(-\frac{\pi}{15} \right)$$



(10)

$$\cos \left(\frac{\pi}{15} \right)$$

$$11) \quad \begin{array}{l|l} 6 \tan x & = 3 \tan x - \sqrt{3} \\ -3 \tan x & -3 \tan x \end{array}$$

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

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

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

$$\downarrow$$

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

$$x = 150^\circ \text{ or } 330^\circ$$

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

↓ Think!

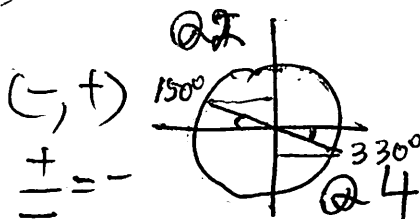
$$6g = 3g - \sqrt{3}$$

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

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

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

$$\left(-\frac{1}{2} \right) / \frac{\sqrt{3}}{2} \quad \text{or} \quad \frac{1}{2} / -\frac{\sqrt{3}}{2}$$



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

$$(+, -)$$

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

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

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

$$\sqrt{3} = 2 \tan \theta$$

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

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

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

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

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

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

$$\theta = 15^\circ \text{ or } 330^\circ$$

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

$$\theta = 15^\circ \text{ or } 330^\circ$$



$$\theta = 15^\circ$$

$$\theta = 330^\circ$$

$$13) \quad \begin{array}{r} 7 \tan^2 x - 4 = 10 \tan^2 x - 5 \\ -7 \tan^2 x \quad \quad -7 \tan^2 x \\ \hline \end{array}$$



$$\begin{array}{r} -4 = 3 \tan^2 x - 5 \\ +5 \quad \quad +5 \\ \hline 1 = 3 \tan^2 x \\ 3 \quad \quad 3 \end{array}$$

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

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

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

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

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

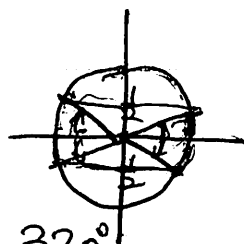
$$\tan^{-1} \frac{\pm \sqrt{3}}{3} = x$$

$$x = 30^\circ, 150^\circ, 210^\circ, 330^\circ$$

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

Think!

$$\begin{array}{r} 7m^2 - 4 = 10m^2 - 5 \\ -7m^2 \quad -7m^2 \\ \hline -4 = 3m^2 - 5 \\ +5 \quad +5 \\ \hline 1 = 3m^2 \\ 3 \quad 3 \\ \hline \frac{1}{3} = m^2 \end{array}$$



$$x = \frac{0}{10}, \frac{0}{10}, \frac{0}{10}, \frac{0}{10}$$

$$x = 270^\circ, 120^\circ, 30^\circ, 270^\circ$$



$$\cos \frac{\pi}{4} = x$$

$$\cos \frac{\pi}{2} = x$$

$$\cos \frac{\pi}{3} = \cos x$$

$$\cos \frac{\pi}{4} = \cos x$$

$$\cos \frac{\pi}{2} = \cos x$$

$$\cos \frac{\pi}{3} = \cos x$$

$$\cos \frac{\pi}{4} = \cos x$$

$$-1 = \cos x - 2$$



$$\frac{3}{4} = \cos x$$

$$\frac{3}{4} = \cos x$$

$$-1 = \cos x - 2$$

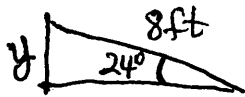
$$-1 = \cos x - 2$$

WORK:

$$1 - \cos x = -1 - \cos x$$

$$1 - \cos x - 1 = -1 - \cos x - 2$$

15)



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

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

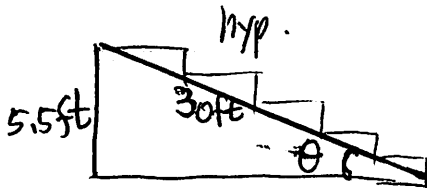
$$\frac{0.4067}{1} \approx \frac{y}{8}$$

$$y \approx 8(0.4067)$$

$$y \approx 3.25$$

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

17)
opp.



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

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

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

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

$$\theta \approx \boxed{11^\circ} \rightarrow \text{rounded to nearest degree}$$



$$\frac{P}{4} = 2$$

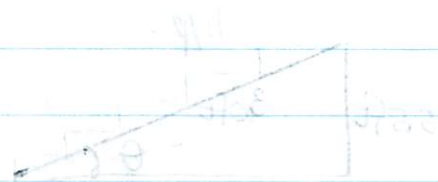
$$\frac{P}{8} = 4 \times 10^4$$

$$\frac{P}{8} = 40000$$

$$(40000)8 = P$$

$$P = 320000$$

$$P = 3.2 \times 10^5$$



$$\frac{P}{4} = 2$$

$$\frac{P}{4} = 2$$

$$P = 8$$

$$P = 8 \times 10^4$$

$$P = 80000$$

$$P = 8 \times 10^4$$

$$P = 8 \times 10^4$$