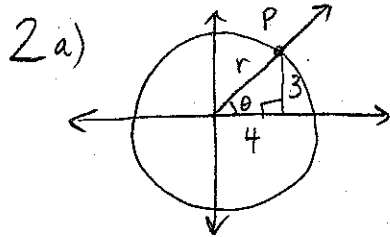


Ch. 3.2 Text Solutions



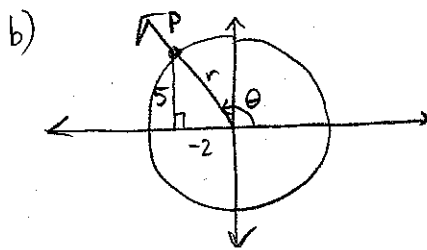
$$3^2 + 4^2 = r^2$$

$$r = 5$$

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

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

$$\tan \theta = \frac{3}{4}$$



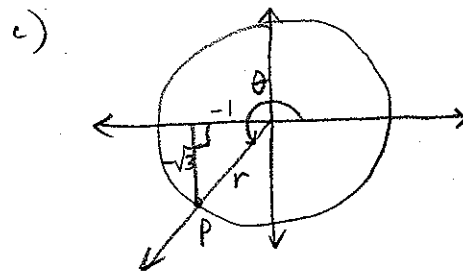
$$(-2)^2 + 5^2 = r^2$$

$$r = \sqrt{29}$$

$$\sin \theta = \frac{5}{\sqrt{29}}$$

$$\cos \theta = \frac{-2}{\sqrt{29}}$$

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



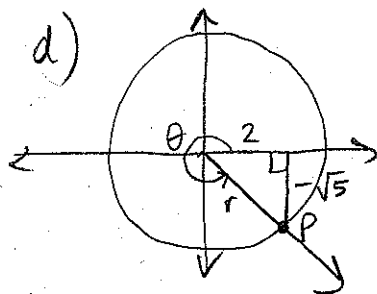
$$(-\sqrt{3})^2 + (-1)^2 = r^2$$

$$r = 2$$

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

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

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



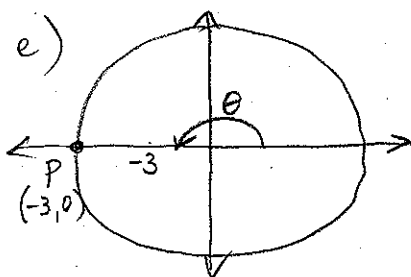
$$2^2 + (-\sqrt{5})^2 = r^2$$

$$r = 3$$

$$\sin \theta = \frac{-\sqrt{5}}{3}$$

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

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



$$(-3)^2 + 0^2 = r^2$$

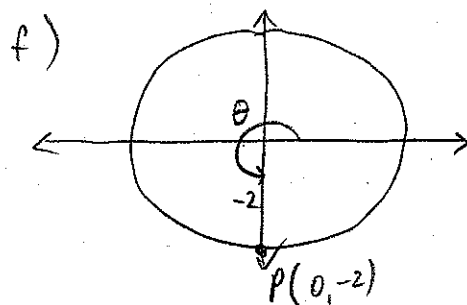
$$r = 3$$

$$\sin \theta = \frac{0}{3} = 0$$

$$\cos \theta = \frac{-3}{3} = -1$$

$$\tan \theta = \frac{0}{-3} = 0$$

* more on this
next section
(3.3)



$$(-2)^2 + 0^2 = r^2$$

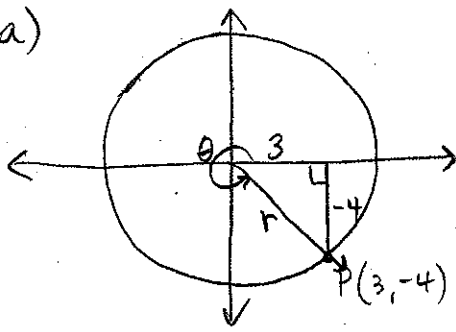
$$r = 2$$

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

$$\cos \theta = \frac{0}{2} = 0$$

$$\tan \theta = \frac{-2}{0} = \text{undefined}$$

3.a)



$$3^2 + (-4)^2 = r^2$$

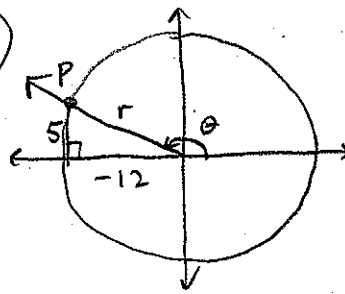
$$r = 5$$

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

$$\cos \theta = \frac{3}{5}$$

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

b)



$$(-12)^2 + 5^2 = r^2$$

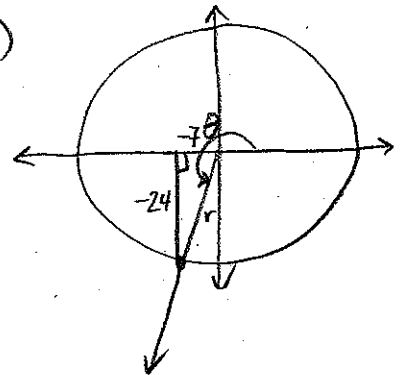
$$r = 13$$

$$\sin \theta = \frac{5}{13}$$

$$\cos \theta = \frac{-12}{13}$$

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

c)



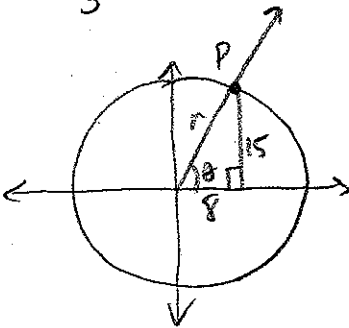
$$(-7)^2 + (-24)^2 = r^2$$

$$r = 25$$

$$\sin \theta = \frac{-24}{25}$$

$$\cos \theta = \frac{-7}{25} \quad \tan \theta = \frac{24}{7}$$

d)



$$8^2 + 15^2 = r^2$$

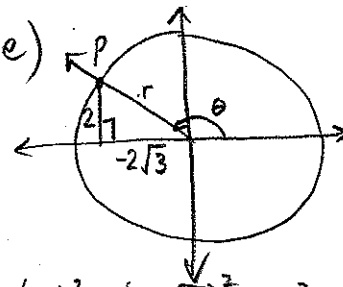
$$r = 17$$

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

$$\cos \theta = \frac{8}{17}$$

$$\tan \theta = \frac{15}{8}$$

e)



$$(2)^2 + (-2\sqrt{3})^2 = r^2$$

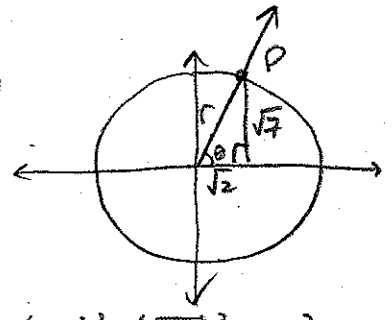
$$r = 4$$

$$\sin \theta = \frac{2}{4} = \frac{1}{2}$$

$$\cos \theta = \frac{-2\sqrt{3}}{4} = \frac{-\sqrt{3}}{2}$$

$$\tan \theta = \frac{2}{-2\sqrt{3}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$$

f)



$$(\sqrt{2})^2 + (\sqrt{7})^2 = r^2$$

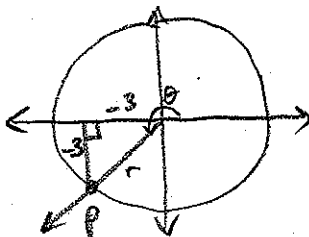
$$r = 3$$

$$\sin \theta = \frac{\sqrt{7}}{3}$$

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

$$\tan \theta = \frac{\sqrt{7}}{\sqrt{2}} = \frac{\sqrt{14}}{2}$$

g)



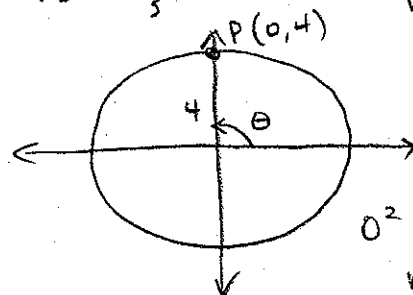
$$(-3)^2 + (-3)^2 = r^2$$

$$r = 3\sqrt{2}$$

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

$$\cos \theta = \frac{-3}{3\sqrt{2}} = \frac{-1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

h)



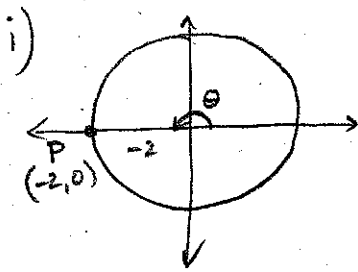
$$0^2 + 4^2 = r^2$$

$$r = 4$$

$$\sin \theta = \frac{4}{4} = 1$$

$$\cos \theta = \frac{0}{4} = 0$$

$$\tan \theta = \frac{4}{4} = 1$$



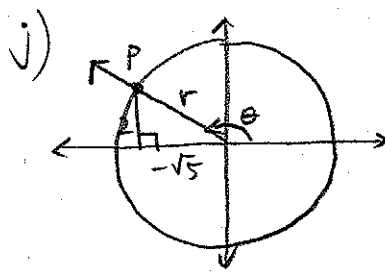
$$(-2)^2 + 0^2 = r^2$$

$$r = 2$$

$$\sin \theta = \frac{0}{2} = 0$$

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

$$\tan \theta = \frac{0}{-2} = 0$$



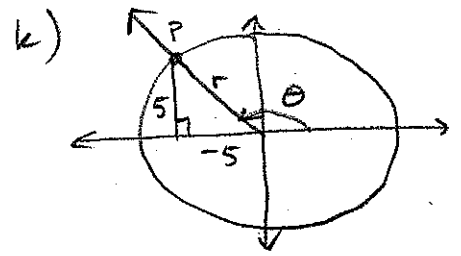
$$2^2 + (-\sqrt{5})^2 = r^2$$

$$r = 3$$

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

$$\cos \theta = \frac{-\sqrt{5}}{3}$$

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



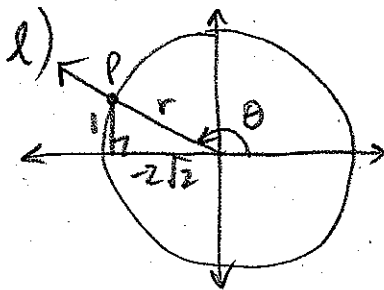
$$5^2 + (-5)^2 = r^2$$

$$r = 5\sqrt{2}$$

$$\sin \theta = \frac{5}{5\sqrt{2}} = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\cos \theta = \frac{-5}{5\sqrt{2}} = \frac{-1}{\sqrt{2}} = \frac{-\sqrt{2}}{2}$$

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



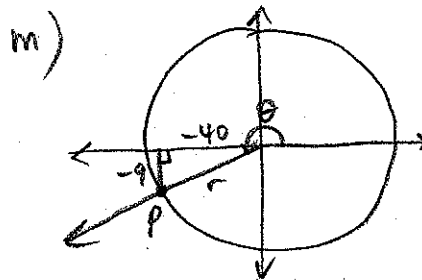
$$1^2 + (-2\sqrt{2})^2 = r^2$$

$$r = 3$$

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

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

$$\tan \theta = \frac{-1}{2\sqrt{2}} = \frac{-\sqrt{2}}{4}$$



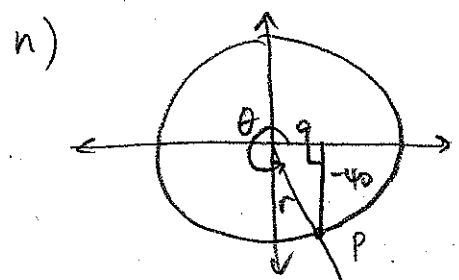
$$(-40)^2 + (-9)^2 = r^2$$

$$r = 41$$

$$\sin \theta = \frac{-9}{41}$$

$$\cos \theta = \frac{-40}{41}$$

$$\tan \theta = \frac{-9}{-40} = \frac{9}{40}$$



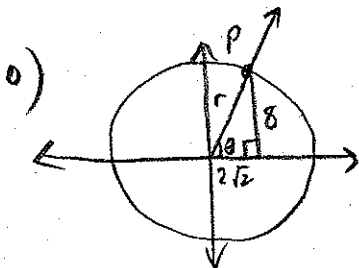
$$9^2 + (-40)^2 = r^2$$

$$r = 41$$

$$\sin \theta = \frac{-40}{41}$$

$$\cos \theta = \frac{9}{41}$$

$$\tan \theta = \frac{-40}{9}$$



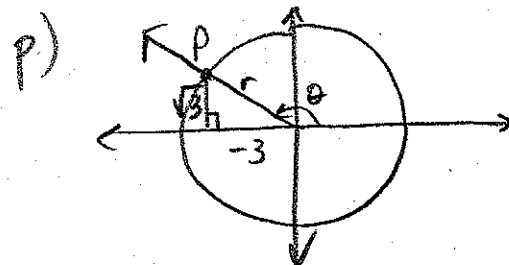
$$(2\sqrt{2})^2 + 8^2 = r^2$$

$$r = 6\sqrt{2}$$

$$\sin \theta = \frac{8}{6\sqrt{2}} = \frac{4}{3\sqrt{2}} = \frac{4\sqrt{2}}{6} = \frac{2\sqrt{2}}{3}$$

$$\cos \theta = \frac{2\sqrt{2}}{6\sqrt{2}} = \frac{1}{3}$$

$$\tan \theta = \frac{8}{2\sqrt{2}} = \frac{4}{\sqrt{2}} = \frac{4\sqrt{2}}{2} = 2\sqrt{2}$$



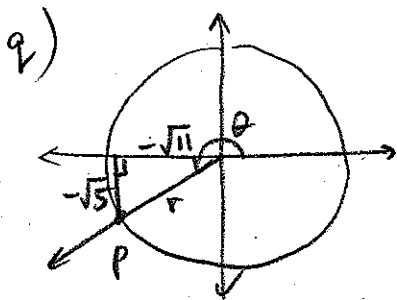
$$(\sqrt{3})^2 + (-3)^2 = r^2$$

$$r = 2\sqrt{3}$$

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

$$\cos \theta = \frac{-3}{2\sqrt{3}} = \frac{-3\sqrt{3}}{6} = \frac{-\sqrt{3}}{2}$$

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



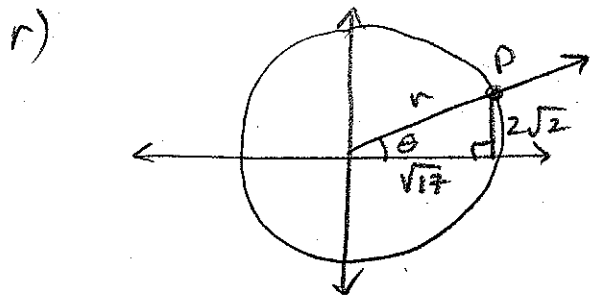
$$(-\sqrt{5})^2 + (-\sqrt{11})^2 = r^2$$

$$r = 4$$

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

$$\cos \theta = -\frac{\sqrt{11}}{4}$$

$$\tan \theta = \frac{-\sqrt{5}}{-\sqrt{11}} = \frac{\sqrt{55}}{11}$$



$$(\sqrt{17})^2 + (2\sqrt{2})^2 = r^2$$

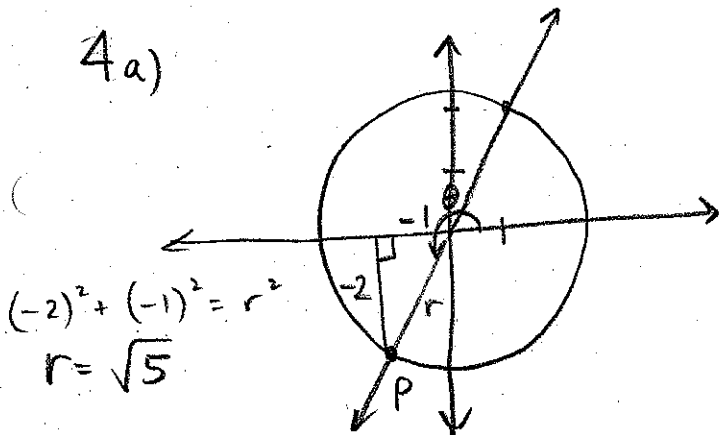
$$r = 5$$

$$\sin \theta = \frac{2\sqrt{2}}{5}$$

$$\cos \theta = \frac{\sqrt{17}}{5}$$

$$\tan \theta = \frac{2\sqrt{2}}{\sqrt{17}} = \frac{2\sqrt{34}}{17}$$

4a)



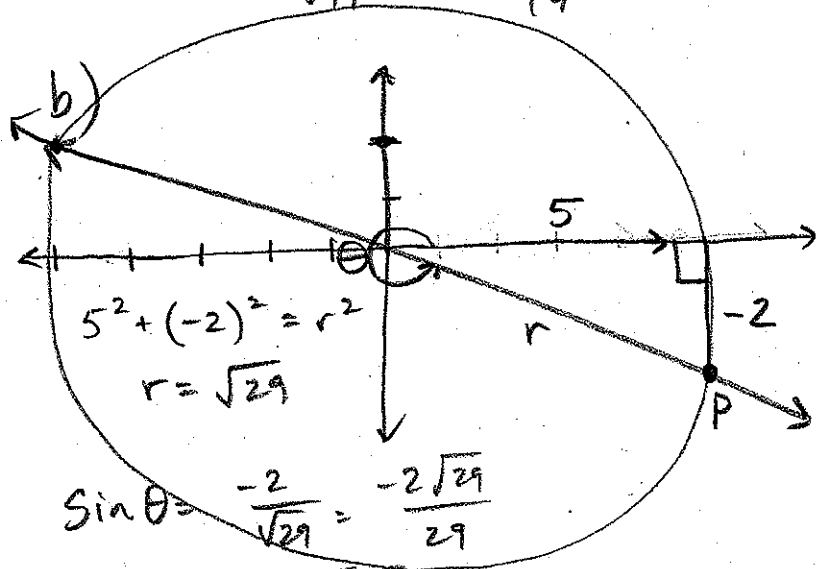
$$(-2)^2 + (-1)^2 = r^2$$

$$r = \sqrt{5}$$

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

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

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



$$5^2 + (-2)^2 = r^2$$

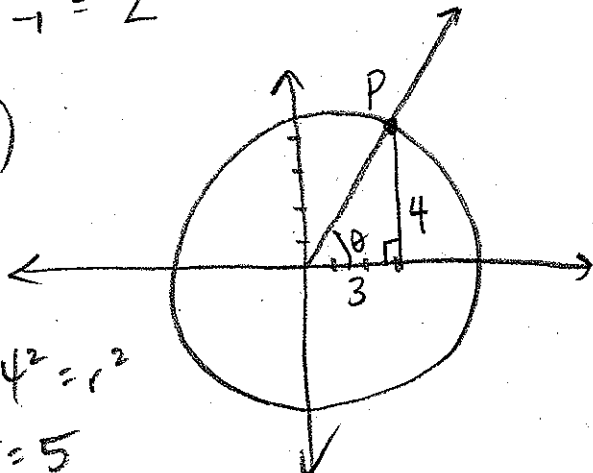
$$r = \sqrt{29}$$

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

$$\cos \theta = \frac{5}{\sqrt{29}} = \frac{5\sqrt{29}}{29}$$

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

c)



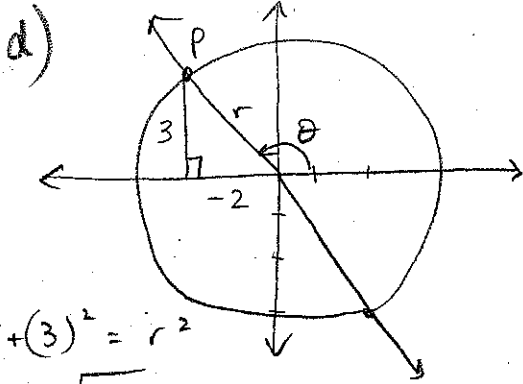
$$3^2 + 4^2 = r^2$$

$$r = 5$$

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

$$\cos \theta = \frac{3}{5}$$

$$\tan \theta = \frac{4}{3}$$



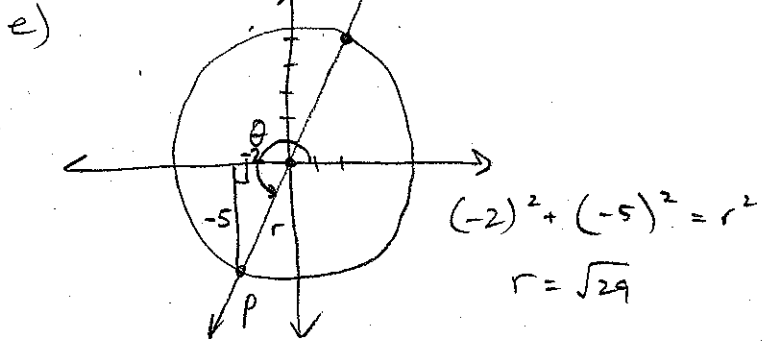
$$(-2)^2 + (3)^2 = r^2$$

$$r = \sqrt{13}$$

$$\sin \theta = \frac{3}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$$

$$\cos \theta = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$$

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



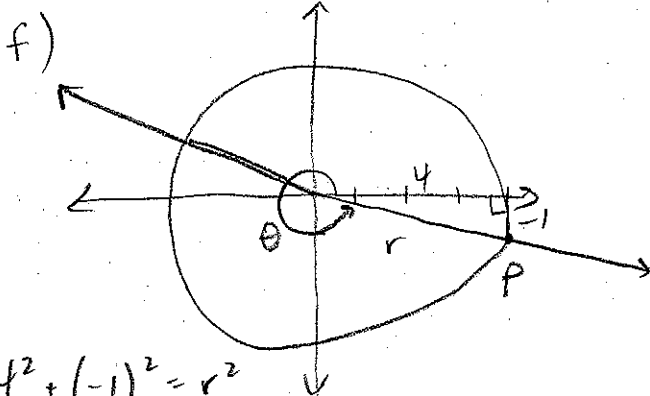
$$(-2)^2 + (-5)^2 = r^2$$

$$r = \sqrt{29}$$

$$\sin \theta = \frac{-5}{\sqrt{29}} = \frac{-5\sqrt{29}}{29}$$

$$\cos \theta = \frac{-2}{\sqrt{29}} = \frac{-2\sqrt{29}}{29}$$

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



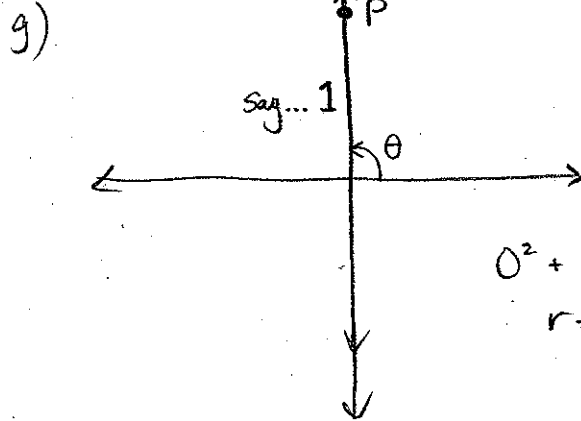
$$4^2 + (-1)^2 = r^2$$

$$r = \sqrt{17}$$

$$\sin \theta = \frac{-1}{\sqrt{17}} = \frac{-\sqrt{17}}{17}$$

$$\cos \theta = \frac{4}{\sqrt{17}} = \frac{4\sqrt{17}}{17}$$

$$\tan \theta = -\frac{1}{4}$$



$$0^2 + 1^2 = r^2$$

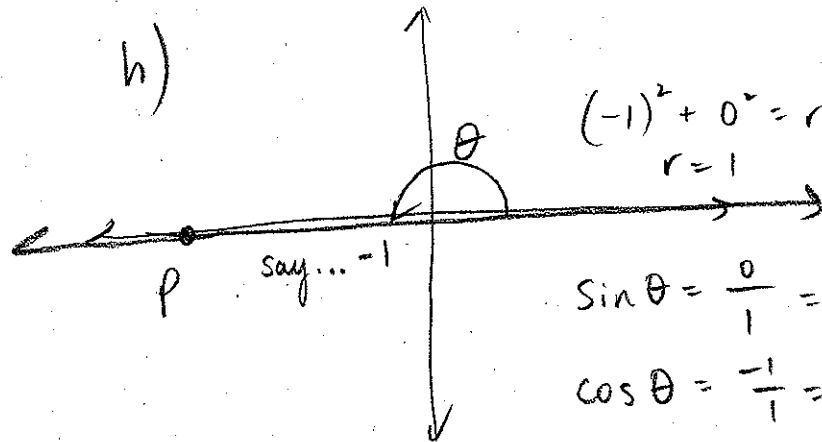
$$r = 1$$

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

$$\cos \theta = \frac{0}{1} = 0$$

$$\tan \theta = \frac{1}{0} = 1$$

* more next section!



$$(-1)^2 + 0^2 = r^2$$

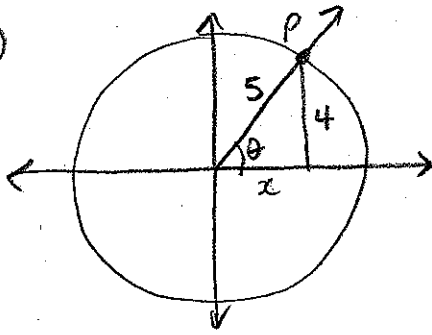
$$r = 1$$

$$\sin \theta = \frac{0}{1} = 0$$

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

$$\tan \theta = \frac{0}{-1} = 0$$

5a)

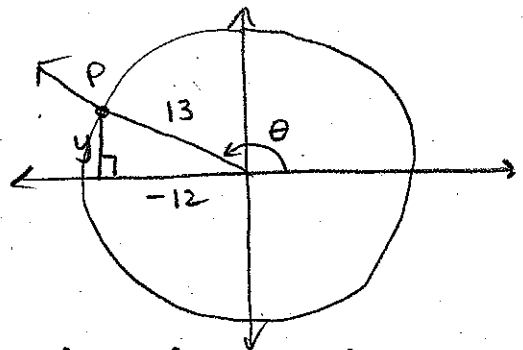


$$x^2 = 5^2 - 4^2$$

$$x = 3$$

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

b)

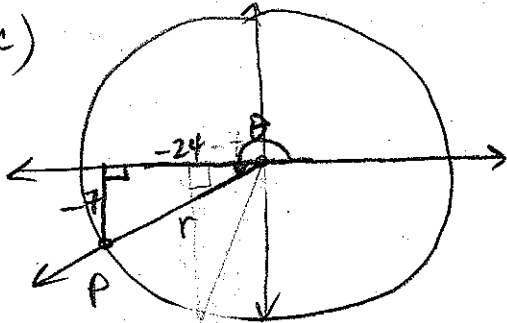


$$y^2 = 13^2 - (-12)^2$$

$$y = 5 \quad \sin \theta = \frac{5}{13}$$

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

c)

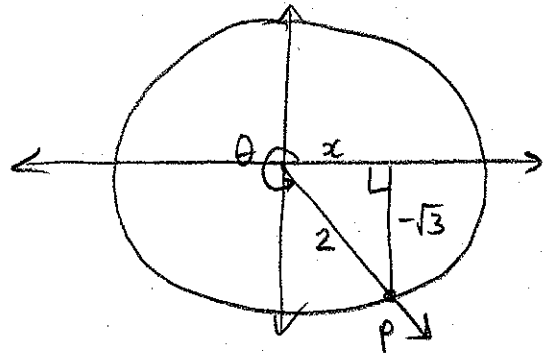


$$(-7)^2 + (-24)^2 = r^2$$

$$r = 25$$

$$\sin \theta = \frac{-7}{25}; \cos \theta = \frac{-24}{25}$$

d)

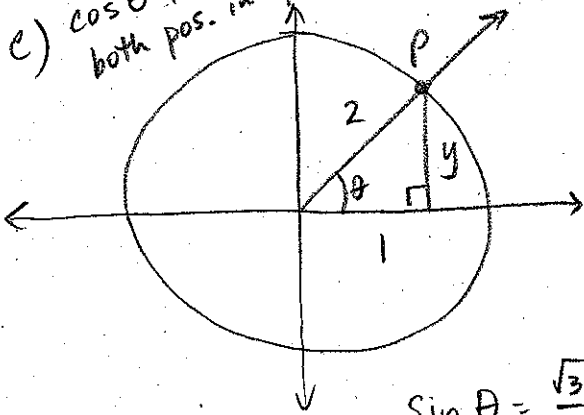


$$x^2 = 2^2 - (-\sqrt{3})^2$$

$$x = 1 \quad \cos \theta = \frac{1}{2}$$

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

e) $\cos \theta \neq \tan \theta$
both pos. in Q.I



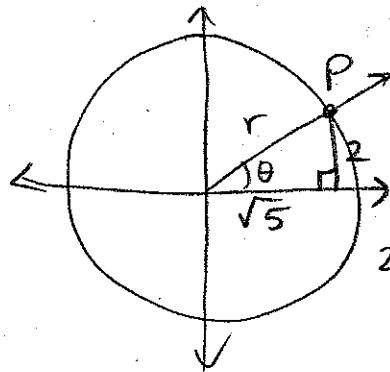
$$y^2 = 2^2 - 1^2$$

$$y = \sqrt{3}$$

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

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

f)



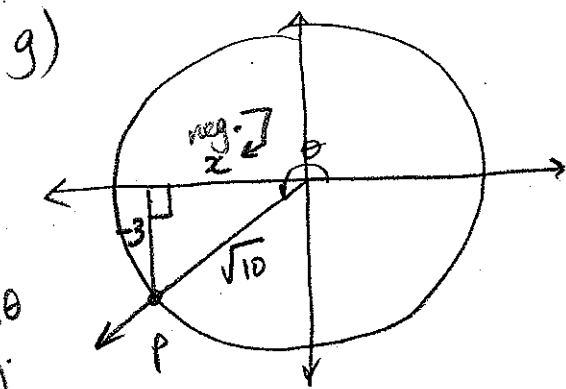
$\sin \theta \neq \tan \theta$
both pos.
in Q.I

$$2^2 + (\sqrt{5})^2 = r^2$$

$$r = 3$$

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

$$\cos \theta = \frac{\sqrt{5}}{3}$$



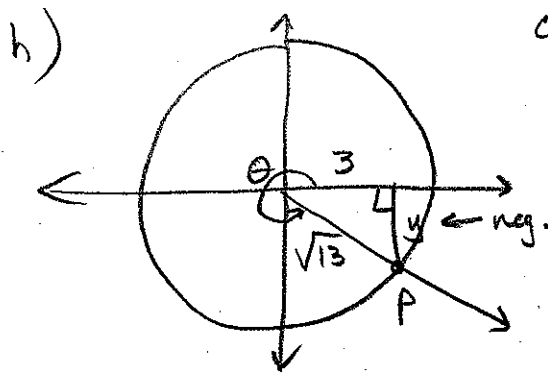
$\sin \theta$ & $\cos \theta$
both neg.
in Q III

$$x^2 = (\sqrt{10})^2 - (-3)^2$$

$$x = \pm \sqrt{1} = \underline{\underline{-1}}$$

$$\cos \theta = \frac{-1}{\sqrt{10}} = \frac{-\sqrt{10}}{10}$$

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



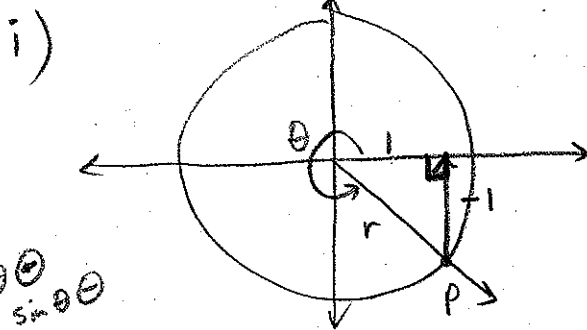
$\cos \theta \oplus$ and
 $\tan \theta \ominus$ in
 Q IV .

$$y^2 = (\sqrt{13})^2 - (3)^2$$

$$y = \pm 2 = \underline{\underline{-2}}$$

$$\sin \theta = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$$

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



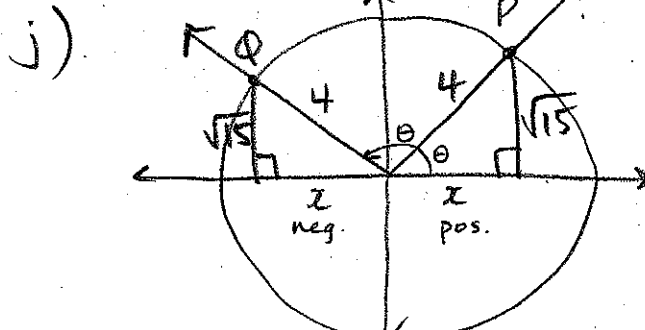
$\tan \theta \ominus$
and $\sin \theta \ominus$
in Q IV

$$r^2 = 1^2 + (-1)^2$$

$$r = \sqrt{2}$$

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

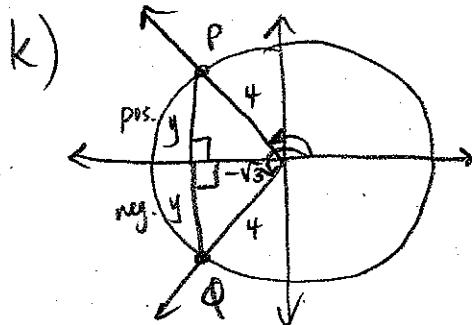
$$\cos \theta = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$



$$x^2 = 4^2 - (\sqrt{15})^2$$

$$x = \pm 1$$

$$\cos \theta = \frac{\pm 1}{4} \quad \tan \theta = \frac{\pm \sqrt{15}}{1} = \pm \sqrt{15}$$



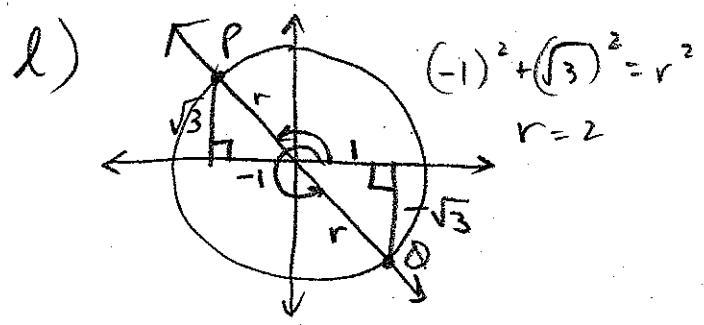
$$\sin \theta = \frac{\pm \sqrt{13}}{4}$$

$$\tan \theta = \frac{\pm \sqrt{13}}{\sqrt{3}}$$

$$= \frac{\pm \sqrt{39}}{3}$$

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

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



$$(-1)^2 + (\sqrt{3})^2 = r^2$$

$$r = 2$$

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

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

#6) see back of text.

7) a) $y = -2x + 1$

$y = 3x + 6$

$-2x + 1 = 3x + 6$

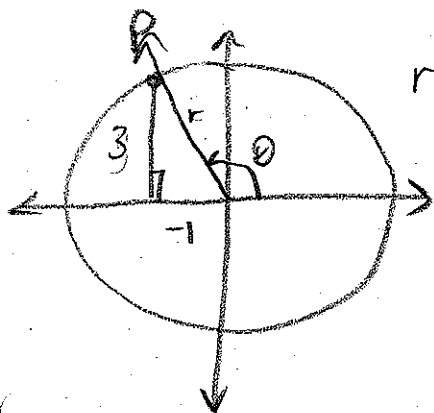
$-5 = 5x$

$x = -1$

$y = -2(-1) + 1$

$y = 3$

$P = (-1, 3)$



$r^2 = (-1)^2 + (3)^2$

$r = \sqrt{10}$

$\sin \theta = \frac{3}{\sqrt{10}} = \frac{3\sqrt{10}}{10}$

$\cos \theta = \frac{-1}{\sqrt{10}} = -\frac{\sqrt{10}}{10}$

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

b) $y = -3x + 10$

$4y = x - 12$

$y = \frac{1}{4}x - 3$

$-3x + 10 = \frac{1}{4}x - 3$

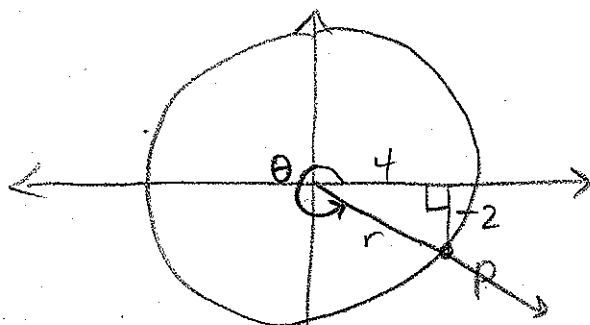
$13 = \frac{13}{4}x$

$x = 4$

$y = -3(4) + 10$

$y = -2$

$P = (4, -2)$



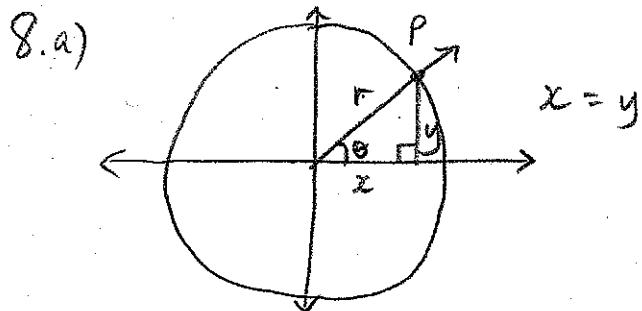
$r^2 = 4^2 + (-2)^2$

$r = 2\sqrt{5}$

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

$\cos \theta = \frac{4}{2\sqrt{5}} = \frac{2\sqrt{5}}{5}$

$\tan \theta = \frac{-2}{4} = -\frac{1}{2}$



let $x=1$
 $y=1$ then $r = \sqrt{2}$

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

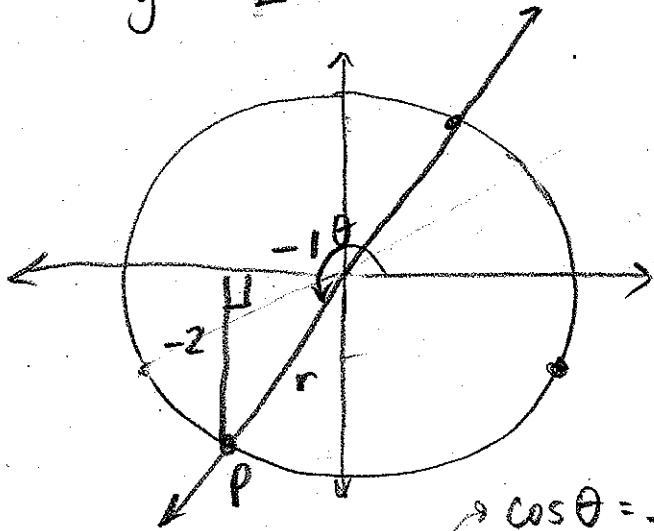
$$\cos \theta = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$$

$$\tan \theta = 1$$

c) $A(1, 4)$ $B(-3, -4)$

rise = -8
 run = -4 slope = $+2$

$$y = -2x$$



$$r^2 = (-2)^2 + (-1)^2$$

$$r = \sqrt{5}$$

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

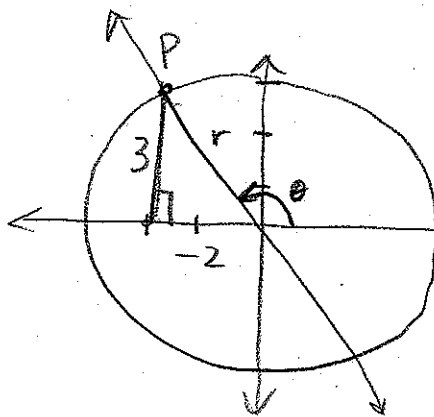
$$\cos \theta = \frac{-1}{\sqrt{5}} = \frac{-\sqrt{5}}{5}$$

$$\tan \theta = 2$$

b) $2y = -3x + 2$

$$y = -\frac{3}{2}x + 1$$

So ... our line $\Rightarrow y = -\frac{3}{2}x$
 (to go through ORIGIN)



$$r^2 = 3^2 + (-2)^2$$

$$r = \sqrt{13}$$

$$\sin \theta = \frac{3}{\sqrt{13}} = \frac{3\sqrt{13}}{13}$$

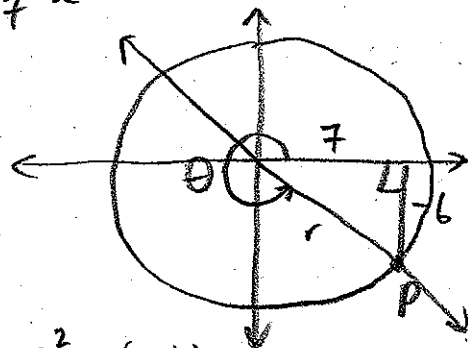
$$\cos \theta = \frac{-2}{\sqrt{13}} = \frac{-2\sqrt{13}}{13}$$

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

d) $A(-2, 4)$ $B(5, -2)$

rise = -6
 run = 7 slope = $-\frac{6}{7}$

$$y = -\frac{6}{7}x$$



$$r^2 = 7^2 + (-6)^2$$

$$r = \sqrt{85}$$

$$\sin \theta = \frac{-6}{\sqrt{85}} = \frac{-6\sqrt{85}}{85}$$

$$\cos \theta = \frac{7}{\sqrt{85}} = \frac{7\sqrt{85}}{85}$$

$$\tan \theta = \frac{-6}{7}$$