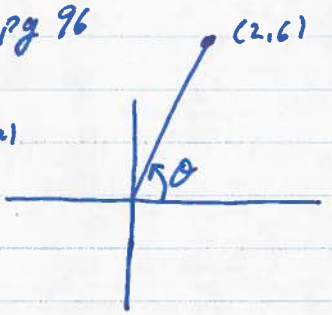
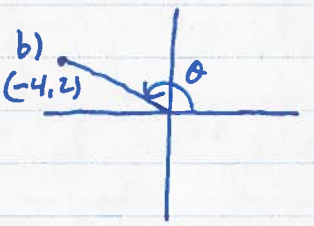
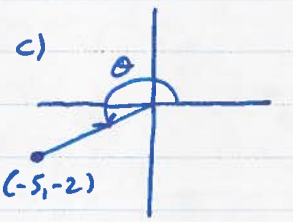
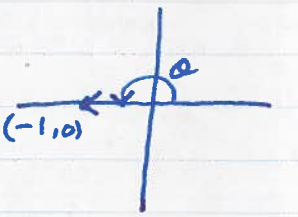
2.2 pg 96

#1 a) 


b) 


c) 

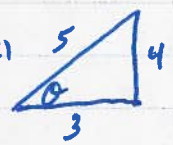

d) 


2 a) $\sin 60° = \frac{\sqrt{3}}{2}$ $\cos 60° = \frac{1}{2}$ $\tan 60° = \sqrt{3}$

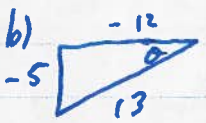
b) $\sin 225° = -\frac{\sqrt{2}}{2}$ $\cos 225° = -\frac{\sqrt{2}}{2}$ $\tan 225° = 1$

c) $\sin 150° = \frac{1}{2}$ $\cos 150° = -\frac{\sqrt{3}}{2}$ $\tan 150° = -\frac{\sqrt{3}}{3}$

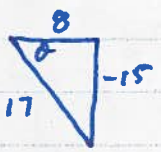
d) $\sin 90° = 1$ $\cos 90 = 0$ $\tan 90$ is undefined

3. a) 

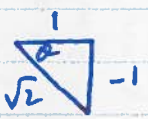
$\sin\theta = \frac{4}{5}$ $\cos\theta = \frac{3}{5}$ $\tan\theta = \frac{4}{3}$

b) 

$\sin\theta = -\frac{5}{13}$ $\cos\theta = -\frac{12}{13}$ $\tan\theta = \frac{5}{12}$

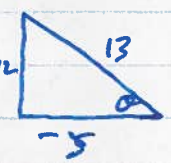
c) 

$\sin\theta = -\frac{15}{17}$ $\cos\theta = \frac{8}{17}$ $\tan\theta = -\frac{15}{8}$

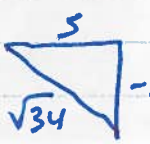
d) 

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

4 a) II b) I c) III d) IV

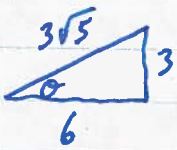
5 a) 

$\sin\theta = \frac{12}{13}$ $\cos\theta = -\frac{5}{13}$ $\tan\theta = -\frac{12}{5}$

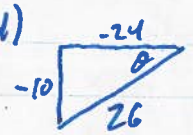
b) 

$\sin\theta = \frac{-3\sqrt{34}}{34}$ $\cos\theta = \frac{5\sqrt{34}}{34}$ $\tan\theta = -\frac{3}{5}$

Hilroy

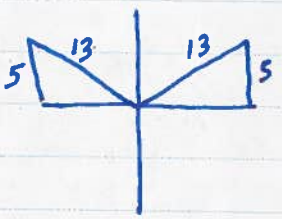
5c) 

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

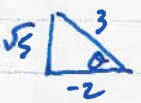
d) 

$\sin\theta = -\frac{5}{13}$ $\cos\theta = -\frac{12}{13}$ $\tan\theta = \frac{5}{12}$

6 a) quad II (+) b) quad IV (+) c) quad II (−) d) quad III (−)

7a) 

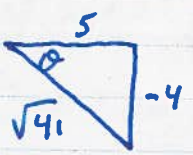
$\sin\theta = 5/13$
$\theta = 23°$ or $157°$

8 a) 

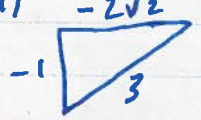
$\sin\theta = \frac{\sqrt{5}}{3}$ $\tan\theta = -\frac{\sqrt{5}}{2}$

b) 

$\cos\theta = 4/5$ $\tan\theta = 3/4$

c) 

$\sin\theta = \frac{-4\sqrt{41}}{41}$ $\cos\theta = \frac{5\sqrt{41}}{41}$

d) 

$\cos\theta = -\frac{2\sqrt{2}}{3}$ $\tan\theta = +\frac{1}{2\sqrt{2}} = +\frac{\sqrt{2}}{4}$

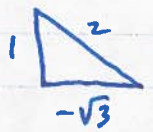
e) 

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

9. a) $\cos\theta = 1/2$ $\theta = 60°, 300°$

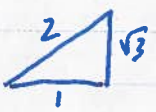
b) $\cos\theta = -\sqrt{2}/2$ $\theta = 135°, 225°$

Hilroy

c) 

$\sin\theta = \frac{1}{2}$ ∴ reference angle 30°
150°, 330°

d) $\sin\theta = -\frac{\sqrt{3}}{2}$ $\theta = 240°, 300°$

e) 

$\cos\theta = \frac{1}{2}$ ∴ reference angle 60° 60°, 240°

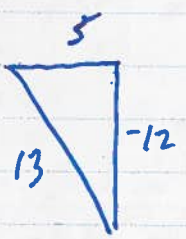
f) $\tan\theta = -1$ 135°, 315°

10.

| $\theta$ | $\sin\theta$ | $\cos\theta$ | $\tan\theta$ |
|---|---|---|---|
| 0 | 0 | 1 | 0 |
| 90 | 1 | 0 | und. |
| 180 | 0 | -1 | 0 |
| 270 | -1 | 0 | und |
| 360 | 0 | 1 | 0 |

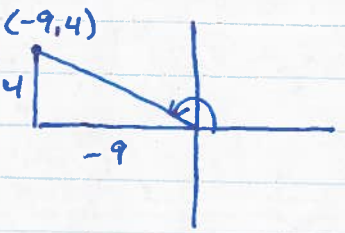
11(a) 

$x = -8$ $\sin\theta = 3/5$
$y = 6$ $\cos\theta = -4/5$
$r = 10$ $\tan\theta = -3/4$

b) 

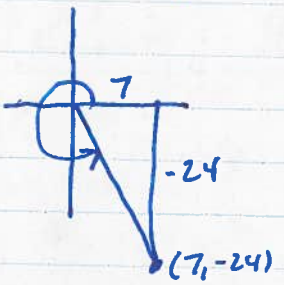
$x = 5$ $\sin\theta = -12/13$
$y = -12$ $\cos\theta = 5/13$
$r = 13$ $\tan\theta = -12/5$

2.2 pg 97

12a) 

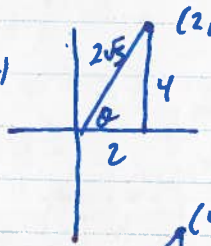

b) ref angle $\tan\theta = 4/9$
$\theta = 24°$

c) $\theta = 156°$

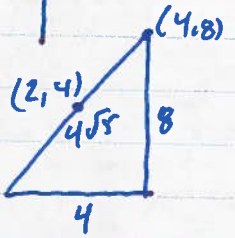
13a) 


b) ref angle $\tan\theta = 24/7$
$\theta = 74°$

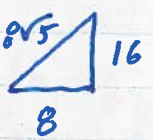
c) $\theta = 286°$

14a) 


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

b) 

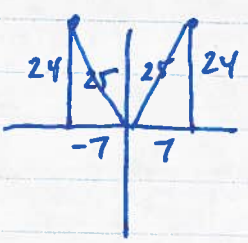

$\sin\theta = \frac{8}{4\sqrt{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

c) 


$\sin\theta = \frac{16}{8\sqrt{5}} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$

d) angle doesn't change ∴ ratio of sides doesn't change
(and sine is a ratio of the sides)

15 $k^2 + 24^2 = 25^2$
$k^2 = 49$
$k = \pm 7$




a) $\tan\theta = 24/7$
$\theta = 74°$ or $106°$

b) $\sin\theta = 24/25$
$\cos\theta = \pm 7/25$
$\tan\theta = \pm 24/7$

16. $\sin^2\theta + \cos^2\theta = 1$

$\sin^2\theta + \left(\frac{1}{5}\right)^2 = 1$

$\sin^2\theta + \frac{1}{25} = \frac{25}{25}$

$\sin^2\theta = \frac{24}{25}$

$\sin\theta = \pm \frac{2\sqrt{6}}{5}$

$\cos \oplus$, $\tan \oplus$ $\therefore$ quad I and sine is $\oplus$

$\therefore \sin\theta = \frac{2\sqrt{6}}{5}$

17. equator $\theta = 0$ $\sin\theta = 0$ $\cos\theta = 1$ $\tan\theta = 0$

poles $\theta = 90$ $\sin\theta = 1$ $\cos\theta = 0$ $\tan\theta$ undefined

18. a) true $\sin\theta = \sin(180-\theta)$

b) true ref angle 45° ($\sin\theta = \cos\theta$ for 45°) both negative

c) false quad II $\tan \ominus$ quad III $\tan \oplus$

d) true $\sin 60 = \cos 30$

e) true $(0, -1)$ $(-1, 0)$

$\uparrow$ $\sin 270$ $\uparrow$ $\cos 180$

19.

| angle | $\sin\theta$ | $\cos\theta$ | $\tan\theta$ |
|---|---|---|---|
| 0 | 0 | 1 | 0 |
| 30 | $1/2$ | $\sqrt{3}/2$ | $\sqrt{3}/3$ |
| 45 | $\sqrt{2}/2$ | $\sqrt{2}/2$ | 1 |
| 60 | $\sqrt{3}/2$ | $1/2$ | $\sqrt{3}$ |
| 90 | 1 | 0 | und |
| 120 | $\sqrt{3}/2$ | $-1/2$ | $-\sqrt{3}$ |
| 135 | $\sqrt{2}/2$ | $-\sqrt{2}/2$ | $-1$ |
| 150 | $1/2$ | $-\sqrt{3}/2$ | $-\sqrt{3}/3$ |
| 180 | 0 | $-1$ | 0 |
| 210 | $-1/2$ | $-\sqrt{3}/2$ | $\sqrt{3}/3$ |
| 225 | $-\sqrt{2}/2$ | $-\sqrt{2}/2$ | 1 |
| 240 | $-\sqrt{3}/2$ | $-1/2$ | $\sqrt{3}$ |
| 270 | $-1$ | 0 | und |
| 300 | $-\sqrt{3}/2$ | $1/2$ | $-\sqrt{3}$ |
| 315 | $-\sqrt{2}/2$ | $\sqrt{2}/2$ | $-1$ |
| 330 | $-1/2$ | $\sqrt{3}/2$ | $-\sqrt{3}/3$ |
| 360 | 0 | 1 | 0 |

20. a) A $45^\circ$ B $135^\circ$ C $225^\circ$ D $315^\circ$

b) $\left(\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ $\left(-\frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\right)$ $\left(-\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$ $\left(\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\right)$

21 a)

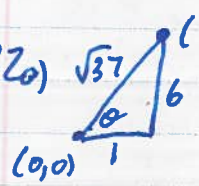
| angle | sin θ | cos θ | tan θ |
|---|---|---|---|
| 0 | 0 | 1 | 0 |
| 15 | 0.259 | 0.966 | 0.268 |
| 30 | .5 | 0.866 | 0.577 |
| 45 | 0.707 | 0.707 | 1 |
| 60 | 0.866 | 0.5 | 1.732 |
| 75 | 0.966 | 0.259 | 3.732 |
| 90 | 1 | 0 | und |
| 105 | 0.966 | -0.259 | -3.732 |
| 120 | 0.866 | -0.5 | -1.732 |
| 135 | 0.707 | -0.707 | -1 |
| 150 | 0.5 | -0.866 | -0.577 |
| 165 | 0.259 | -0.966 | -0.268 |
| 180 | 0 | -1 | 0 |

b) sine: increases from 0 to 90, decreases from 90 to 180
cosine: decreases from 0 to 180
tan: increases from 0 to 90, increases from 90 to 180

c) sine and cosine have the same values, out of phase $\sin\theta = \cos(90-\theta)$

d) cosine and tangent ⊕ to ⊖, sine is ⊕ from 0 to 180

e) cosine ⊕ from 270 to 90, ⊖ from 90 to 270
sine ⊕ from 0 to 180, ⊖ from 180 to 360
tan ⊕ in quad I (0 to 90) and III (180 to 270)
⊖ in quad II (90 to 180) and IV (270 to 360)

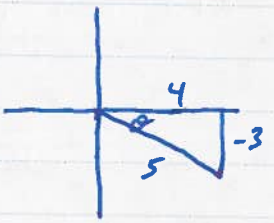
22a) 


$\sin\theta = \frac{6\sqrt{37}}{37}$ $\cos\theta = \frac{\sqrt{37}}{37}$ $\tan\theta = 6$

Hilbert

22b) $3x+4y=0$

| $x$ | $y$ |
|---|---|
| 0 | 0 |
| 4 | -3 |




$\cos\theta = 4/5$

$\tan\theta = -3/4$

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

$= \frac{16}{20} - \frac{15}{20} = \frac{1}{20}$

Hilroy