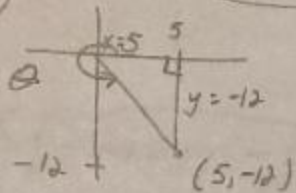


Homework Solutions Sec 1.3

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11.

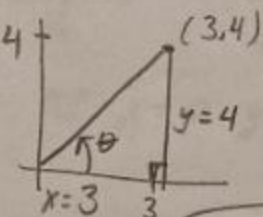


$$\begin{aligned} r &= \sqrt{(5)^2 + (-12)^2} \\ &= \sqrt{25 + 144} \\ &= \sqrt{169} \\ &= 13 \end{aligned}$$

$$\begin{aligned} \text{so } x &= 5 \\ y &= -12 \\ r &= 13 \end{aligned}$$

$$\begin{aligned} \sin(\theta) &= \frac{y}{r} = -\frac{12}{13} & \csc(\theta) &= \frac{r}{y} = -\frac{13}{12} \\ \cos(\theta) &= \frac{x}{r} = \frac{5}{13} & \sec(\theta) &= \frac{r}{x} = \frac{13}{5} \\ \tan(\theta) &= \frac{y}{x} = -\frac{12}{5} & \cot(\theta) &= \frac{x}{y} = -\frac{5}{12} \end{aligned}$$

13.

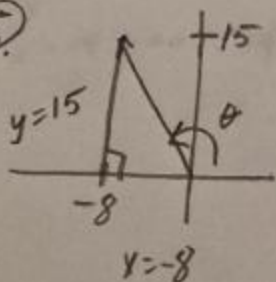


$$\begin{aligned} r &= \sqrt{(3)^2 + (4)^2} \\ &= \sqrt{9 + 16} \\ &= \sqrt{25} \\ &= 5 \end{aligned}$$

$$\begin{aligned} \text{so } x &= 3 \\ y &= 4 \\ r &= 5 \end{aligned}$$

$$\begin{aligned} \sin(\theta) &= \frac{4}{5} & \csc(\theta) &= \frac{5}{4} \\ \cos(\theta) &= \frac{3}{5} & \sec(\theta) &= \frac{5}{3} \\ \tan(\theta) &= \frac{4}{3} & \cot(\theta) &= \frac{3}{4} \end{aligned}$$

15.



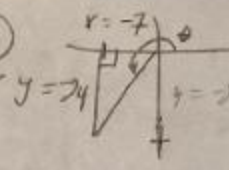
$$\begin{aligned} r &= \sqrt{(-8)^2 + (15)^2} \\ &= \sqrt{64 + 225} \\ &= \sqrt{289} \\ &= 17 \end{aligned}$$

$$\text{so } \sin(\theta) = \frac{15}{17} \quad \csc(\theta) = \frac{17}{15}$$

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

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

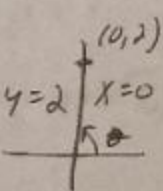
$$\text{so } x = -8 \quad y = 15 \quad r = 17$$

17)  $r = \sqrt{(-7)^2 + (-24)^2}$
 $= \sqrt{49 + 576}$
 $= \sqrt{625}$
 $= 25$
 $x = -7$
 $y = -24$
 $r = 25$

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$\frac{SO}{2}$

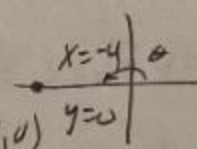
$\sin(\theta) = -\frac{24}{25}$	$\csc(\theta) = -\frac{25}{24}$
$\cos(\theta) = -\frac{7}{25}$	$\sec(\theta) = -\frac{25}{7}$
$\tan(\theta) = \frac{-24}{-7} = \frac{24}{7}$	$\cot(\theta) = \frac{7}{24}$

19)  $r = \sqrt{(0)^2 + (2)^2}$
 $= \sqrt{0 + 4}$
 $= \sqrt{4}$
 $= 2$

$\frac{SO}{2}$ $x = 0$ $y = 2$ $r = 2$

$\frac{SO}{2}$

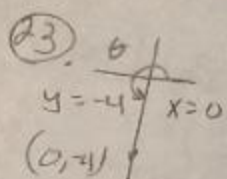
$\sin(\theta) = \frac{2}{2} = 1$
$\cos(\theta) = \frac{0}{2} = 0$
$\tan(\theta) \Rightarrow \frac{2}{0} \rightarrow \text{undef}$
$\cot(\theta) = \frac{0}{2} = 0$
$\sec(\theta) \Rightarrow \frac{2}{0} \rightarrow \text{undef}$
$\csc(\theta) = \frac{2}{2} = 1$

21)  $r = \sqrt{(-4)^2 + (0)^2}$
 $= \sqrt{16 + 0}$
 $= \sqrt{16}$
 $= 4$

$\frac{SO}{2}$ $x = -4$ $y = 0$ $r = 4$

$\frac{SO}{2}$

$\sin(\theta) = \frac{0}{4} = 0$	$\csc(\theta) \Rightarrow \frac{4}{0} \rightarrow \text{undef}$
$\cos(\theta) = -\frac{4}{4} = -1$	$\sec(\theta) = -\frac{4}{4} = -1$
$\tan(\theta) = \frac{0}{4} = 0$	$\cot(\theta) \Rightarrow \frac{4}{0} \rightarrow \text{undef}$



So $x=0$ $y=-4$ $r=4$

$$r = \sqrt{(0)^2 + (-4)^2}$$

$$= \sqrt{0+16}$$

$$= \sqrt{16}$$

$$= 4$$

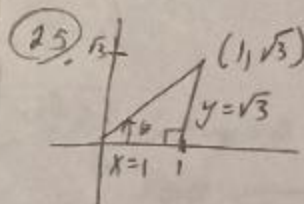
So

$$\sin(\theta) = \frac{-4}{4} = -1 \quad \csc(\theta) = \frac{4}{-4} = -1$$

$$\cos(\theta) = \frac{0}{4} = 0 \quad \sec(\theta) = \frac{4}{0} \rightarrow \text{und.}$$

$$\tan(\theta) = \frac{-4}{0} \rightarrow \text{und.} \quad \cot(\theta) = \frac{0}{-4} = 0$$

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So $x=\sqrt{3}$ $y=1$ $r=2$

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

$$= \sqrt{1+3}$$

$$= \sqrt{4}$$

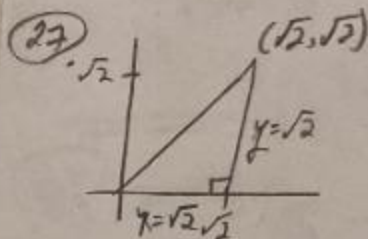
$$= 2$$

So

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

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

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



So $x=\sqrt{2}$ $y=\sqrt{2}$ $r=2$

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

$$= \sqrt{2+2}$$

$$= \sqrt{4}$$

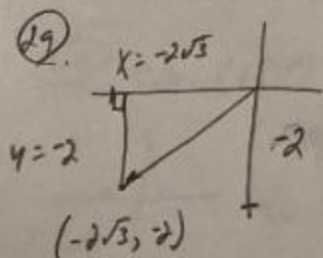
$$= 2$$

So

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

$$\cos(\theta) = \frac{\sqrt{2}}{2} \quad \sec(\theta) = \frac{2}{\sqrt{2}}$$

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



So $x=-2\sqrt{3}$ $y=-2$ $r=4$

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

$$= \sqrt{4 \cdot 3 + 4}$$

$$= \sqrt{16}$$

$$= 4$$

So

$$\sin(\theta) = \frac{-2}{4} = -\frac{1}{2} \quad \csc(\theta) = \frac{-2}{1} = -2$$

$$\cos(\theta) = \frac{-2\sqrt{3}}{4} = -\frac{\sqrt{3}}{2} \quad \sec(\theta) = -\frac{2}{\sqrt{3}}$$

$$\tan(\theta) = \frac{-2}{-2\sqrt{3}} = \frac{1}{\sqrt{3}} \quad \cot(\theta) = \frac{\sqrt{3}}{1} = \sqrt{3}$$

#51. $2x+y=0$ Let $x=1 \Rightarrow y=-2$

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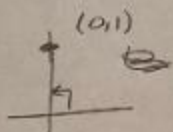
$x \geq 0 \Rightarrow (1, -2)$
 $\Rightarrow r = \sqrt{(1)^2 + (-2)^2} = \sqrt{1+4} = \sqrt{5}$
 $x=1, y=-2$
 $r = \sqrt{5}$

$\sin(\theta) = \frac{-2}{\sqrt{5}} \quad \csc(\theta) = -\frac{\sqrt{5}}{2}$
 $\cos(\theta) = \frac{1}{\sqrt{5}} \quad \sec(\theta) = \frac{\sqrt{5}}{1} = \sqrt{5}$
 $\tan(\theta) = \frac{-2}{1} = -2 \quad \cot(\theta) = -\frac{1}{2}$

#53. $-6x-y=0$ Let $x=-1 \Rightarrow y=6$

$x \leq 0 \Rightarrow (-1, 6)$
 $\Rightarrow r = \sqrt{(-1)^2 + (6)^2} = \sqrt{1+36} = \sqrt{37}$
 $x=-1, y=6$
 $r = \sqrt{37}$

$\sin(\theta) = \frac{6}{\sqrt{37}} \quad \csc(\theta) = \frac{\sqrt{37}}{6}$
 $\cos(\theta) = \frac{-1}{\sqrt{37}} \quad \sec(\theta) = \frac{\sqrt{37}}{-1} = -\sqrt{37}$
 $\tan(\theta) = \frac{6}{-1} = -6 \quad \cot(\theta) = -\frac{1}{6}$

#63. $\cos(90^\circ) \Rightarrow$ 

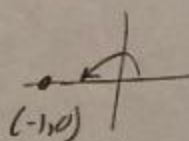
$(0, 1) \Rightarrow x=0, y=1 \Rightarrow r = \sqrt{(0)^2 + (1)^2} = \sqrt{0+1} = \sqrt{1} = 1$

so $\cos(90^\circ) = \frac{x}{r} = \frac{0}{1} = \boxed{0}$

#65. $\tan(180^\circ)$

$(-1, 0) \Rightarrow x=-1, y=0 \Rightarrow r = \sqrt{(-1)^2 + (0)^2} = \sqrt{1+0} = 1$

so $\tan(180^\circ) = \frac{y}{x} = \frac{0}{-1} = \boxed{0}$



#67. $\sec(180^\circ)$

$(-1, 0) \Rightarrow x=-1, y=0 \Rightarrow r = \sqrt{(-1)^2 + (0)^2} = \sqrt{1+0} = 1$

so $\sec(180^\circ) = \frac{r}{x} = \frac{1}{-1} = \boxed{-1}$

