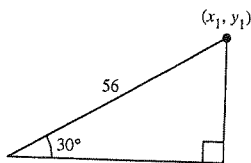


64.



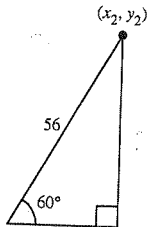
$$\sin 30^\circ = \frac{y_1}{56}$$

$$y_1 = (\sin 30^\circ)(56) = \left(\frac{1}{2}\right)(56) = 28$$

$$\cos 30^\circ = \frac{x_1}{56}$$

$$x_1 = \cos 30^\circ(56) = \frac{\sqrt{3}}{2}(56) = 28\sqrt{3}$$

$$(x_1, y_1) = (28\sqrt{3}, 28)$$



$$\sin 60^\circ = \frac{y_2}{56}$$

$$y_2 = \sin 60^\circ(56) = \left(\frac{\sqrt{3}}{2}\right)(56) = 28\sqrt{3}$$

$$\cos 60^\circ = \frac{x_2}{56}$$

$$x_2 = (\cos 60^\circ)(56) = \left(\frac{1}{2}\right)(56) = 28$$

$$(x_2, y_2) = (28, 28\sqrt{3})$$

66.  $x \approx 9.397$ ,  $y \approx 3.420$ 

$$\sin 20^\circ = \frac{y}{10} \approx 0.34$$

$$\cos 20^\circ = \frac{x}{10} \approx 0.94$$

$$\tan 20^\circ = \frac{y}{x} \approx 0.36$$

$$\cot 20^\circ = \frac{x}{y} \approx 2.75$$

$$\sec 20^\circ = \frac{10}{x} \approx 1.06$$

$$\csc 20^\circ = \frac{10}{y} \approx 2.92$$

68. True.  $\sec \theta = \csc(90^\circ - \theta)$  for all  $\theta$ 70. True.  $1 + \cot^2 \theta = \csc^2 \theta$  for all  $\theta$ 

72.

$\theta$	$0^\circ$	$20^\circ$	$40^\circ$	$60^\circ$	$80^\circ$
$\cos \theta$	1	0.9397	0.7660	0.5000	0.1736
$\sin(90^\circ - \theta)$	1	0.9397	0.7660	0.5000	0.1736

$$\cos \theta = \sin(90^\circ - \theta)$$

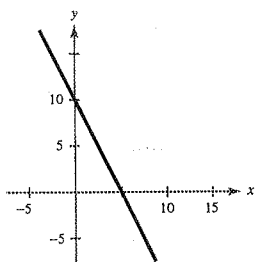
$\theta$  and  $90^\circ - \theta$  are complementary angles.

74.  $2x + y = 10$

$$y = -2x + 10$$

x-intercept:  $(5, 0)$

y-intercept:  $(0, 10)$



76.  $12x - 7y = 22$

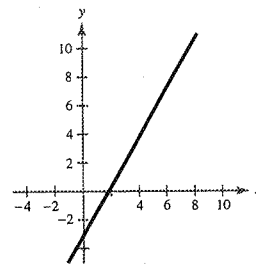
$$y = \frac{12}{7}x - \frac{22}{7}$$

x-intercept:

$$12x = 22 \Rightarrow \left(\frac{11}{6}, 0\right)$$

y-intercept:

$$-7y = 22 \Rightarrow \left(0, -\frac{22}{7}\right)$$



78.  $4^2\pi \approx 6065.331$

80.  $\sqrt[5]{10,321} \approx 6.350$

## Section 5.3 Trigonometric Functions of Any Angle

### Solutions to Even-Numbered Exercises

2. (a)  $x = 12, y = -5$

$$r = \sqrt{12^2 + (-5)^2} = 13$$

$$\sin \theta = \frac{y}{r} = \frac{-5}{13} = -\frac{5}{13}$$

$$\cos \theta = \frac{x}{r} = \frac{12}{13}$$

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

$$\csc \theta = \frac{r}{y} = \frac{13}{-5} = -\frac{13}{5}$$

$$\sec \theta = \frac{r}{x} = \frac{13}{12}$$

$$\cot \theta = \frac{x}{y} = \frac{12}{-5} = -\frac{12}{5}$$

(b)  $x = -1, y = 1$

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

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

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

$$\tan \theta = \frac{y}{x} = \frac{1}{-1} = -1$$

$$\csc \theta = \frac{r}{y} = \frac{\sqrt{2}}{1} = \sqrt{2}$$

$$\sec \theta = \frac{r}{x} = \frac{\sqrt{2}}{-1} = -\sqrt{2}$$

$$\cot \theta = \frac{x}{y} = \frac{-1}{1} = -1$$

4. (a)  $x = 2, y = 1$

$$r = \sqrt{2^2 + 1^2} = \sqrt{5}$$

$$\sin \theta = \frac{y}{r} = \frac{1}{\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\cos \theta = \frac{x}{r} = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

$$\tan \theta = \frac{y}{x} = \frac{1}{2}$$

$$\csc \theta = \frac{r}{y} = \sqrt{5}$$

$$\sec \theta = \frac{r}{x} = \frac{\sqrt{5}}{2}$$

$$\cot \theta = \frac{x}{y} = 2$$

(b)  $x = 2, y = -4$

$$r = \sqrt{2^2 + (-4)^2} = 2\sqrt{5}$$

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

$$\cos \theta = \frac{x}{r} = \frac{2}{2\sqrt{5}} = \frac{\sqrt{5}}{5}$$

$$\tan \theta = \frac{y}{x} = \frac{-4}{2} = -2$$

$$\csc \theta = \frac{r}{y} = \frac{2\sqrt{5}}{-4} = -\frac{\sqrt{5}}{2}$$

$$\sec \theta = \frac{r}{x} = \frac{2\sqrt{5}}{2} = \sqrt{5}$$

$$\cot \theta = \frac{x}{y} = \frac{2}{-4} = -\frac{1}{2}$$