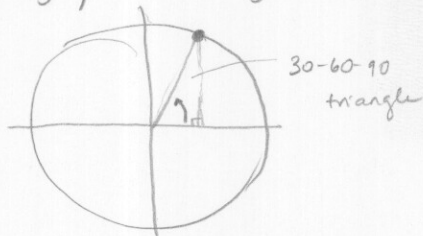


Homework 6 Solutions

Section 9.2

odds

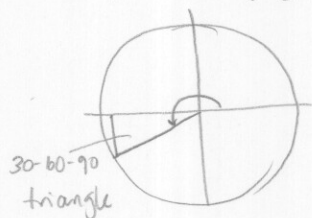
$$37. \cos\left(\frac{7\pi}{3}\right) = \cos\left(\frac{7\pi}{3} - 2\pi\right) = \cos\left(\frac{\pi}{3}\right)$$



$$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2}$$

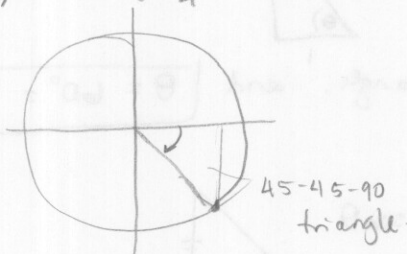
Evens

$$40. \sin\left(\frac{19\pi}{6}\right) = \sin\left(\frac{19\pi}{6} - 2\pi\right) = \sin\left(\frac{7\pi}{6}\right)$$



$$\sin\left(\frac{7\pi}{6}\right) = -\frac{1}{2}$$

$$42. \cos\left(-\frac{9\pi}{4}\right) = \cos\left(-\frac{9\pi}{4} + 2\pi\right) = \cos\left(-\frac{\pi}{4}\right)$$

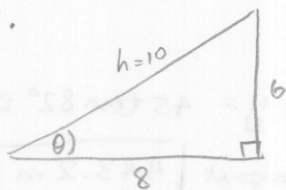


$$\cos\left(-\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$$

Section 9.3

odds

5.



Using the Pythagorean theorem, $6^2 + 8^2 = h^2$
 $36 + 64 = 100 = h^2$
 $h = 10$

$$\sin \theta = \frac{6}{10} = \frac{3}{5}$$

$$\cos \theta = \frac{8}{10} = \frac{4}{5}$$

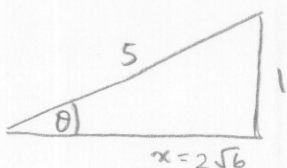
$$\tan \theta = \frac{6}{8} = \frac{3}{4}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{5}{4}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{4}{3}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{3}$$

17. Given $\sin \theta = \frac{1}{5}$



$$x^2 + 1 = 5^2$$

$$x^2 = 24, \text{ so } x = \sqrt{24} = 2\sqrt{6}$$

$$\cos \theta = \frac{\text{adj}}{\text{hyp}} = \frac{2\sqrt{6}}{5}$$

$$\tan \theta = \frac{\text{opp}}{\text{adj}} = \frac{1}{2\sqrt{6}} = \frac{\sqrt{6}}{12}$$

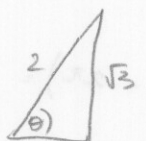
$$\sec \theta = \frac{1}{\cos \theta} = \frac{5}{2\sqrt{6}} = \frac{5\sqrt{6}}{12}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = 2\sqrt{6}$$

$$\csc \theta = \frac{1}{\sin \theta} = 5$$

59. a) $\sec \theta = 2$

$$\sec \theta = 2 \Rightarrow \cos \theta = \frac{1}{\sec \theta} = \frac{1}{2}$$



This is a 30-60-90 triangle, and $\theta = 60^\circ = \frac{\pi}{3}$ radians.

b) $\cot \theta = 1$

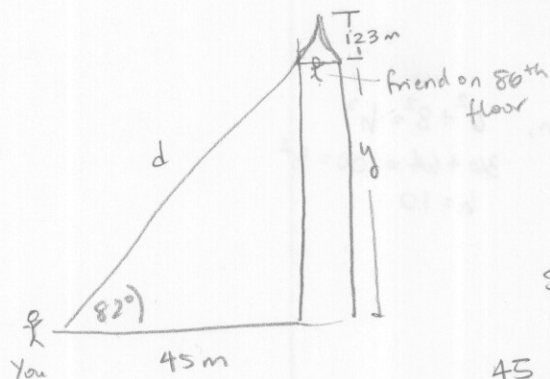
$$\cot \theta = \frac{\cos \theta}{\sin \theta} = 1 \Rightarrow \cos \theta = \sin \theta$$



This is a 45-45-90 triangle, and

$$\theta = 45^\circ = \frac{\pi}{4} \text{ radians.}$$

71.



$$\frac{y}{45} = \tan 82^\circ, \text{ so } y = 45 \tan 82^\circ \approx 320.2 \text{ m.}$$

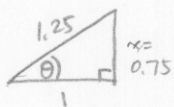
So the total height is about 443.2 m

$$\frac{45}{d} = \cos 82^\circ, \text{ so } d = \frac{45}{\cos 82^\circ} \approx 323.3 \text{ m.}$$

So the distance to your friend is about 323.3 m

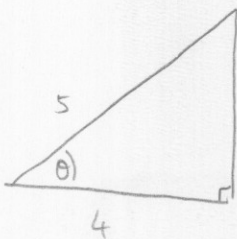
Evens

10.



$$x^2 = (1.25)^2 - 1^2$$

$$x = 0.75$$



$$y = 3$$

$$5^2 - 4^2 = y^2$$

$$25 - 16 = 9 = y^2$$

$$y = 3$$

These are similar triangles, so the angles are equal.

Therefore, the trig. functions will be equal.

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

$$\sec \theta = \frac{1}{\cos \theta} = \frac{5}{4}$$

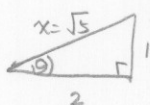
$$\cos \theta = \frac{4}{5}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{4}{3}$$

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

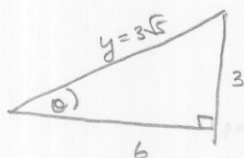
$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{3}$$

12.



$$x^2 = 1^2 + 2^2$$

$$x = \sqrt{5}$$



$$y^2 = 3^2 + 6^2 = 9 + 36 = 45 = 9 \cdot 5$$

$$y = 3\sqrt{5}$$

As in 10, these are similar triangles and the angles are equal.

Therefore, the trig functions are equal.

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

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

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

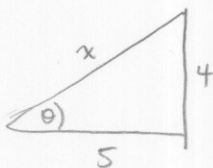
$$\cot \theta = \frac{\cos \theta}{\sin \theta} = 2$$

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

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

16.

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



$$x^2 = 4^2 + 5^2 = 16 + 25 = 41$$

$$x = \sqrt{41}$$

$$\sin \theta = \frac{4}{\sqrt{41}} = \frac{4\sqrt{41}}{41}$$

$$\sec \theta = \frac{1}{\cos \theta} = \frac{\sqrt{41}}{5}$$

$$\cos \theta = \frac{5}{\sqrt{41}} = \frac{5\sqrt{41}}{41}$$

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

$$\csc \theta = \frac{1}{\sin \theta} = \frac{\sqrt{41}}{4}$$

18. $\sec \theta = \frac{17}{7}$ $\sec \theta = \frac{1}{\cos \theta} = \frac{\text{hyp}}{\text{adj}}$



$$17^2 - 7^2 = x^2$$

$$289 - 49 = x^2$$

$$x = \sqrt{240} = 4\sqrt{15}$$

$$\sin \theta = \frac{4\sqrt{15}}{17}$$

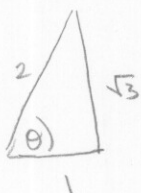
$$\cos \theta = \frac{7}{17}$$

$$\tan \theta = \frac{4\sqrt{15}}{7}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{7}{4\sqrt{15}} = \frac{7\sqrt{15}}{60}$$

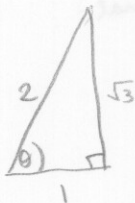
$$\csc \theta = \frac{1}{\sin \theta} = \frac{17}{4\sqrt{15}} = \frac{17\sqrt{15}}{60}$$

60. a) $\tan \theta = \sqrt{3}$



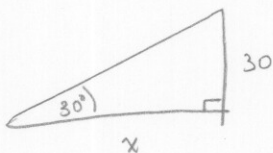
This is a 30-60-90 triangle
and $\theta = 60^\circ = \pi/3$ radians.

b) $\cos \theta = \frac{1}{2} = \frac{\text{adj}}{\text{hyp}}$



This is a 30-60-90 triangle
and $\theta = 60^\circ = \pi/3$ radians.

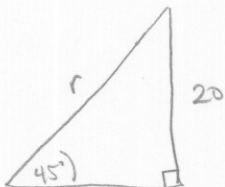
64.



$$\tan 30^\circ = \frac{30}{x} = \frac{1}{2} \cdot \frac{2}{\sqrt{3}} = \frac{1}{\sqrt{3}}$$

$$30 \boxed{x = 30\sqrt{3}}$$

66.

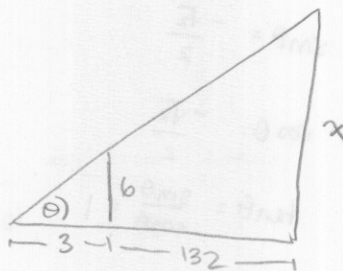
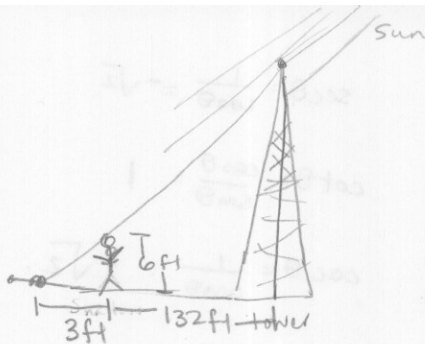


$$\sin 45^\circ = \frac{20}{r} = \frac{\sqrt{2}}{2}$$

$$r = \frac{20 \cdot 2}{\sqrt{2}} = \boxed{20\sqrt{2}}$$

72.

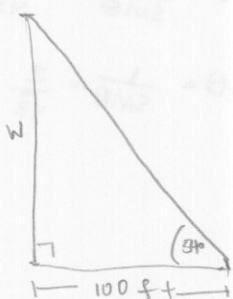
a)



$$b) \tan \theta = \frac{x}{135} = \frac{6}{3}$$

$$c) \frac{6}{3} = \frac{x}{135} \Rightarrow 2 = \frac{x}{135} \Rightarrow \boxed{x = 270 \text{ ft}}$$

74.



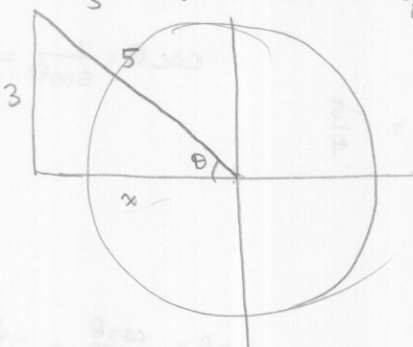
$$\frac{w}{100} = \tan 54^\circ$$

$$\text{So } w = 100 \tan 54^\circ \approx \boxed{137.6 \text{ ft}}$$

Section 9.4

odds.

$$25. \sin \theta = \frac{3}{5} \text{ and } \theta \text{ lies in quadrant II.}$$



$$3^2 + x^2 = 5^2 \Rightarrow x = \pm 4$$

Since we're in quadrant II, we can think of x as negative.

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

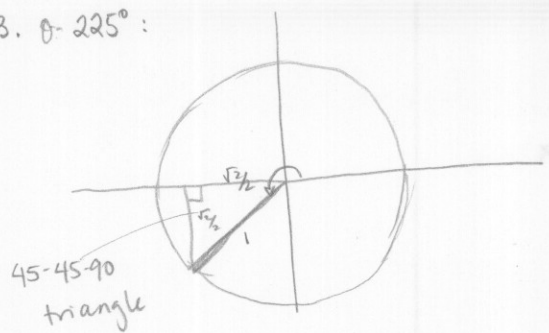
$$\tan \theta = -\frac{3}{4}$$

$$\sec \theta = \frac{1}{\cos \theta} = -\frac{5}{4}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = -\frac{4}{3}$$

$$\csc \theta = \frac{1}{\sin \theta} = \frac{5}{3}$$

53. $\theta = 225^\circ$:



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

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

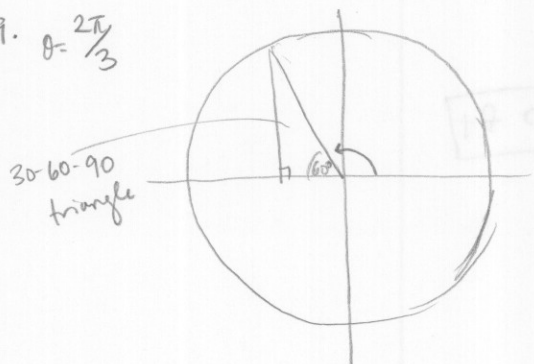
$$\tan \theta = \frac{\sin \theta}{\cos \theta} = 1$$

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

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

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

59. $\theta = \frac{2\pi}{3}$



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

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

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

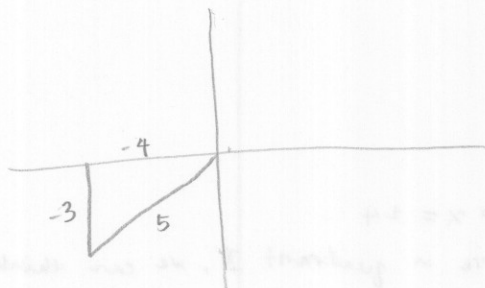
$$\sec \theta = \frac{1}{\cos \theta} = -2$$

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

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

Evens.

26. $\cos \theta = -\frac{4}{5}$, θ lies in quadrant III.



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

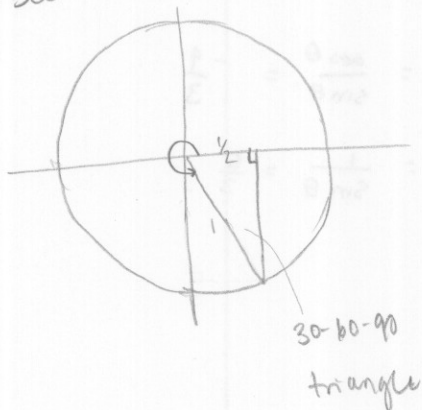
$$\tan \theta = \frac{3}{4}$$

$$\sec \theta = \frac{1}{\cos \theta} = -\frac{5}{4}$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = \frac{4}{3}$$

$$\csc \theta = \frac{1}{\sin \theta} = -\frac{5}{3}$$

54. $\theta = 300^\circ$



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

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

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

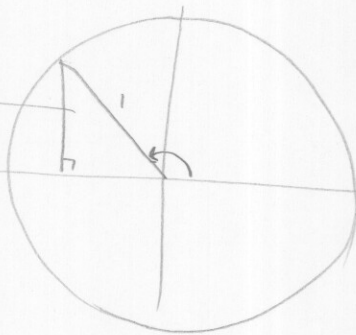
$$\sec \theta = \frac{1}{\cos \theta} = 2$$

$$\cot \theta = \frac{\cos \theta}{\sin \theta} = -\frac{\sqrt{3}}{3}$$

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

60. $\frac{3\pi}{4}$

45-45-90
triangle



$$\sin \frac{3\pi}{4} = \frac{\sqrt{2}}{2}$$

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

$$\tan \frac{3\pi}{4} = -1$$

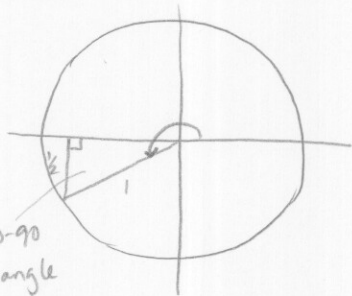
$$\sec \frac{3\pi}{4} = \frac{1}{\cos \frac{3\pi}{4}} = -\sqrt{2}$$

$$\cot \frac{3\pi}{4} = \frac{\cos \frac{3\pi}{4}}{\sin \frac{3\pi}{4}} = -1$$

$$\csc \frac{3\pi}{4} = \frac{1}{\sin \frac{3\pi}{4}} = \sqrt{2}$$

62. $\theta = \frac{7\pi}{6}$

30-60-90
triangle



$$\sin \frac{7\pi}{6} = -\frac{1}{2}$$

$$\cos \frac{7\pi}{6} = -\frac{\sqrt{3}}{2}$$

$$\tan \frac{7\pi}{6} = \frac{\sin \frac{7\pi}{6}}{\cos \frac{7\pi}{6}} = \frac{-\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$$

$$\sec \frac{7\pi}{6} = \frac{1}{\cos \frac{7\pi}{6}} = -\frac{2}{\sqrt{3}}$$

$$\cot \frac{7\pi}{6} = \frac{\cos \frac{7\pi}{6}}{\sin \frac{7\pi}{6}} = \sqrt{3}$$

$$\csc \frac{7\pi}{6} = \frac{1}{\sin \frac{7\pi}{6}} = -2$$