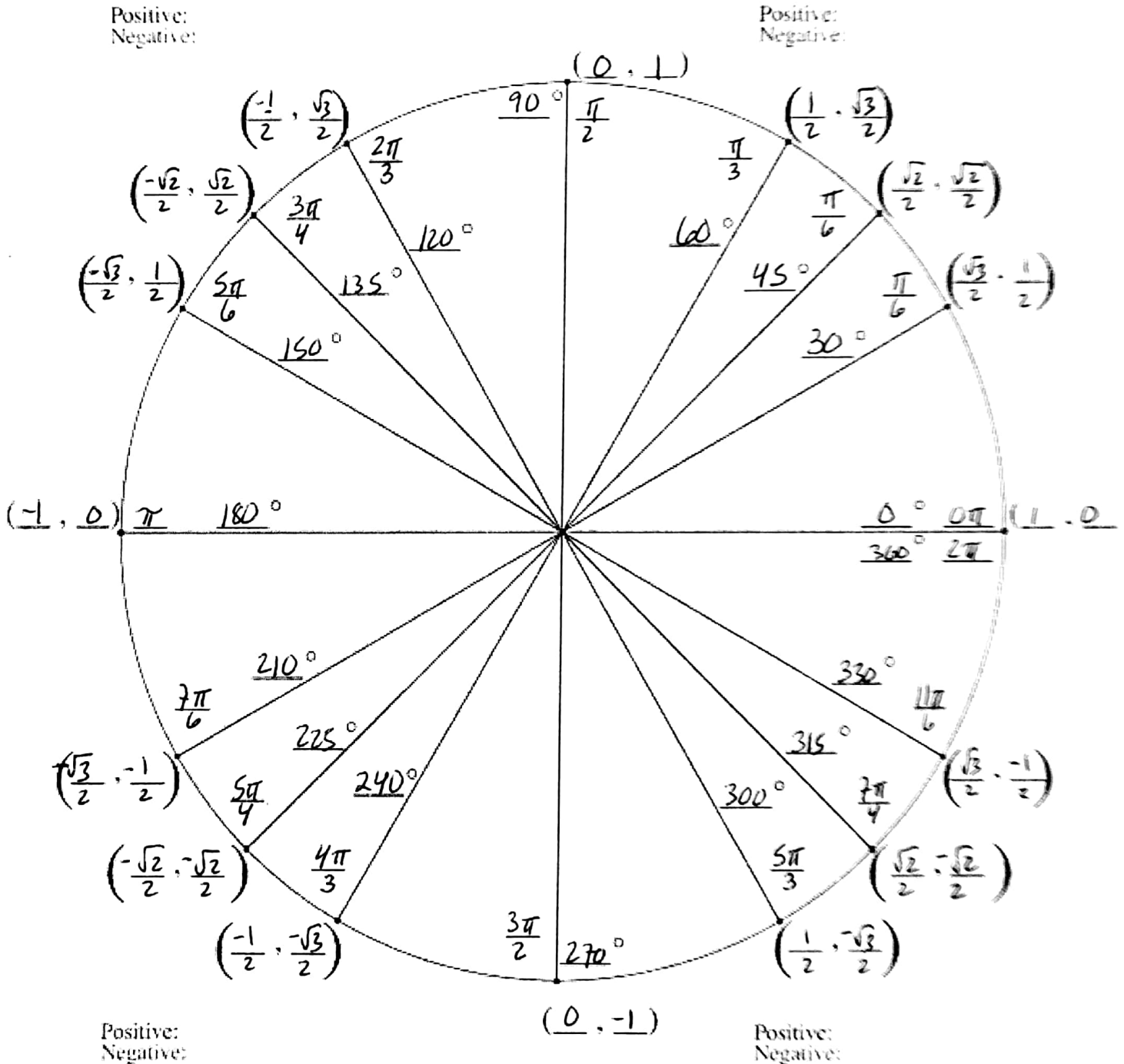


Complete the following without looking at a Unit Circle:



Find the exact value of each of the following values:

$$1. \cot \frac{3\pi}{2} = \frac{\cos \frac{3\pi}{2}}{\sin \frac{3\pi}{2}} = \frac{0}{-1} = 0$$

$$2. \sec 240^\circ = \frac{1}{\cos 240^\circ} = \frac{1}{-\frac{1}{2}} = -2$$

$$3. \cos\left(-\frac{4\pi}{3}\right) = \frac{-\sqrt{2}}{2}$$

$$4. \cot 30^\circ = \frac{\cos 30^\circ}{\sin 30^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$$

$$5. \cos \frac{3\pi}{4} = -\frac{\sqrt{2}}{2}$$

$$6. \sin 225^\circ = -\frac{\sqrt{2}}{2}$$

$$7. \tan \frac{13\pi}{6} = \tan 30^\circ = \frac{\sqrt{3}}{3}$$

$$8. \cos(60^\circ) = \frac{1}{2}$$

$$9. \tan \frac{5\pi}{3} = -\sqrt{3}$$

$$10. \sec 120^\circ = \frac{1}{\cos 120^\circ} = \frac{1}{-\frac{1}{2}} = -2$$

$$11. \tan \frac{\pi}{2} = \text{undefined}$$

$$12. \sin(-270^\circ) = 1$$

$$13. \csc\left(-\frac{3\pi}{4}\right) = \frac{1}{\sin\left(-\frac{3\pi}{4}\right)} = -\sqrt{2}$$

$$14. \sec 330^\circ = \frac{1}{\cos(330^\circ)} = \frac{2\sqrt{3}}{3}$$

$$15. \cot(-\pi) = \text{undefined}$$

$$16. \csc(-225^\circ) = \frac{1}{\sin 225^\circ} = \sqrt{2}$$

$$17. \cot 0^\circ = \text{undefined}$$

$$18. \csc 495^\circ = \csc(135^\circ) = \frac{1}{\sin 135^\circ} = \sqrt{2}$$

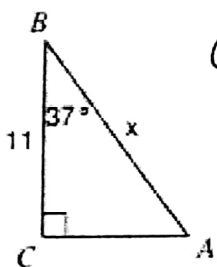
$$19. \csc \frac{5\pi}{6} = \frac{1}{\sin\left(\frac{5\pi}{6}\right)} = 2$$

$$20. \cos 0^\circ = 1$$

$$21. \sec \pi = \frac{1}{\cos \pi} = -1$$

For the following triangles solve for  $x$ , leave answers in trig form:

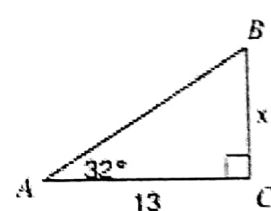
9)



$$\cos(37^\circ) = \frac{11}{x}$$

$$x = \frac{11}{\cos(37^\circ)}$$

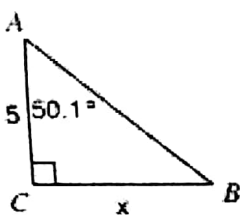
10)



$$\tan(32^\circ) = \frac{x}{13}$$

$$x = 13 \cdot \tan 32^\circ$$

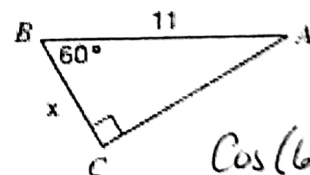
11)



$$\tan(50.1^\circ) = \frac{x}{5}$$

$$x = 5 \cdot \tan(50.1^\circ)$$

12)



$$\cos(60^\circ) = \frac{11}{x}$$

$$x = 11 \cdot \cos(60^\circ)$$

Note:  $\cos(60^\circ) = \frac{1}{2}$  so

$$x = 11 \cdot \frac{1}{2} = 5.5$$

Find the measures of a positive angle and a negative angle that are coterminal with each given angle.

4.  $\theta = 425^\circ$

$785^\circ, 65^\circ, -295^\circ$

5.  $\theta = -316^\circ$

$-676^\circ, 44^\circ, 404^\circ$

6.  $\theta = -800^\circ$

$-440^\circ, -80^\circ, 280^\circ$

7.  $\theta = 281^\circ$

$-79^\circ, 641^\circ$

8.  $\theta = -4^\circ$

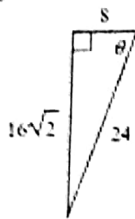
$+356^\circ, -364^\circ$

9.  $\theta = 743^\circ$

$383^\circ, 23^\circ, -337^\circ$

Find the value each trig function, leave in simplified fraction form:

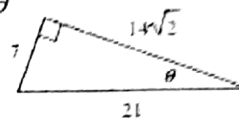
5)  $\csc \theta$



$$\begin{aligned} \csc(\theta) &= \frac{\text{Hyp}}{\text{opp}} \\ \csc(\theta) &= \frac{24}{16\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} \\ &= \frac{24\sqrt{2}}{16 \cdot 2} = \frac{24\sqrt{2}}{32} \end{aligned}$$

$\csc(\theta) = \frac{3\sqrt{2}}{4}$

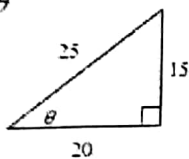
6)  $\cos \theta$



$$\begin{aligned} \cos \theta &= \frac{\text{Adj}}{\text{Hyp}} \\ &= \frac{14\sqrt{2}}{21} \end{aligned}$$

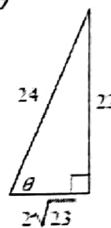
$\cos \theta = \frac{2\sqrt{2}}{3}$

7)  $\cot \theta$



$$\cot(\theta) = \frac{\text{adj}}{\text{opp}} = \frac{20}{15} = \frac{4}{3}$$

8)  $\tan \theta$



$$\begin{aligned} \tan \theta &= \frac{\text{opp}}{\text{adj}} \\ &= \frac{24}{2\sqrt{23}} \cdot \frac{\sqrt{23}}{\sqrt{23}} \\ &= \frac{24\sqrt{23}}{2 \cdot 23} = \end{aligned}$$

$\tan \theta = \frac{11\sqrt{23}}{23}$

Convert each measure from degrees to radians or from radians to degrees.

1.  $\frac{5\pi}{12} =$

$75^\circ$

2.  $215^\circ$

$\frac{43\pi}{36}$

3.  $-\frac{29\pi}{18}$

$-290^\circ$

4.  $-180^\circ$

$-\pi$

5.  $\frac{5\pi}{3}$

$300^\circ$

6.  $-\frac{7\pi}{6}$

$-210^\circ$

7.  $400^\circ$

$\frac{20\pi}{9}$

8.  $\frac{3\pi}{10}$

$54^\circ$

9.  $35^\circ$

$\frac{7\pi}{36}$

Find the exact value of the six trigonometric functions (sin, cos, tan, csc, sec, cot):

16.  $150^\circ$   
 $\sin \theta = \frac{1}{2}$   
 $\cos \theta = -\frac{\sqrt{3}}{2}$   
 $\tan \theta = -\frac{\sqrt{3}}{3}$   
 $\cot \theta = -\sqrt{3}$   
 $\csc \theta = 2$   
 $\sec \theta = -\frac{2\sqrt{3}}{3}$

17.  $-225^\circ$   
 $\sin \theta = -\frac{\sqrt{2}}{2}$   
 $\cos \theta = -\frac{\sqrt{2}}{2}$   
 $\tan \theta = 1$   
 $\cot \theta = 1$   
 $\csc \theta = -\sqrt{2}$   
 $\sec \theta = -\sqrt{2}$

18.  $-300^\circ$   
 $\sin \theta = \frac{\sqrt{2}}{2}$   
 $\cos \theta = \frac{1}{2}$   
 $\tan \theta = \sqrt{3}$   
 $\cot \theta = \frac{\sqrt{3}}{3}$   
 $\csc \theta = \frac{2\sqrt{3}}{3}$   
 $\sec \theta = 2$

19.  $\frac{11\pi}{6}$   
 $\sin \theta = -\frac{1}{2}$   
 $\cos \theta = \frac{\sqrt{3}}{2}$   
 $\tan \theta = -\frac{\sqrt{3}}{3}$   
 $\cot \theta = -\sqrt{3}$   
 $\csc \theta = -2$   
 $\sec \theta = \frac{2\sqrt{3}}{3}$

20.  $-\frac{2\pi}{3}$   
 $\sin \theta = -\frac{\sqrt{3}}{2}$   
 $\cos \theta = -\frac{1}{2}$   
 $\tan \theta = \sqrt{3}$   
 $\cot \theta = \frac{\sqrt{3}}{3}$   
 $\csc \theta = -\frac{2\sqrt{3}}{3}$   
 $\sec \theta = -2$

21.  $\frac{5\pi}{4}$   
 $\sin \theta = -\frac{\sqrt{2}}{2}$   
 $\cos \theta = -\frac{\sqrt{2}}{2}$   
 $\tan \theta = 1$   
 $\cot \theta = 1$   
 $\csc \theta = -\sqrt{2}$   
 $\sec \theta = -\sqrt{2}$

Use the unit circle to find the exact value of each trigonometric function.

10.  $\cos \frac{2\pi}{3} = -\frac{1}{2}$

11.  $\tan \frac{5\pi}{4} = 1$

12.  $\tan \frac{5\pi}{6} = -\frac{\sqrt{3}}{3}$

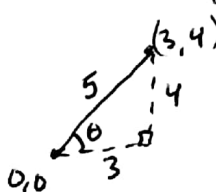
13.  $\sin 315^\circ = -\frac{\sqrt{2}}{2}$

14.  $\cos 225^\circ = -\frac{\sqrt{2}}{2}$

15.  $\tan 60^\circ = \sqrt{3}$

Example 1) Let P be a point on the terminal side of  $\theta$ . Draw a picture and find the 6 trig functions of  $\theta$ .

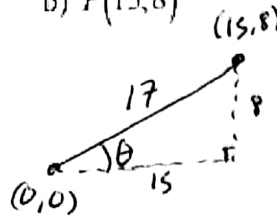
a) P(3,4)



$3^2 + 4^2 = c^2$   
 $9 + 16 = c^2$   
 $25 = c^2$   
 $5 = c$

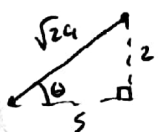
$\sin \theta = \frac{4}{5}$   
 $\cos \theta = \frac{3}{5}$   
 $\tan \theta = \frac{4}{3}$   
 $\csc \theta = \frac{5}{4}$   
 $\sec \theta = \frac{5}{3}$   
 $\cot \theta = \frac{3}{4}$

b) P(15,8)



$\sin \theta = \frac{8}{17}$   
 $\cos \theta = \frac{15}{17}$   
 $\tan \theta = \frac{8}{15}$   
 $\csc \theta = \frac{17}{8}$   
 $\sec \theta = \frac{17}{15}$   
 $\cot \theta = \frac{15}{8}$

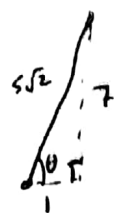
c) P(5,2)



$5^2 + 2^2 = c^2$   
 $25 + 4 = c^2$   
 $29 = c^2$   
 $\sqrt{29} = c$

$\sin \theta = \frac{2}{\sqrt{29}} = \frac{2\sqrt{29}}{29}$   
 $\cos \theta = \frac{5}{\sqrt{29}} = \frac{5\sqrt{29}}{29}$   
 $\tan \theta = \frac{2}{5}$   
 $\csc \theta = \frac{\sqrt{29}}{2}$   
 $\sec \theta = \frac{\sqrt{29}}{5}$   
 $\cot \theta = \frac{5}{2}$

d) P(1,7)



$7^2 + 1^2 = c^2$   
 $50 = c^2$   
 $5\sqrt{2} = c$

$\sin \theta = \frac{7}{5\sqrt{2}} = \frac{7\sqrt{2}}{10}$   
 $\cos \theta = \frac{1}{5\sqrt{2}} = \frac{\sqrt{2}}{10}$   
 $\tan \theta = \frac{7}{1}$   
 $\csc \theta = \frac{5\sqrt{2}}{7}$   
 $\sec \theta = \frac{5\sqrt{2}}{1}$   
 $\cot \theta = \frac{1}{7}$