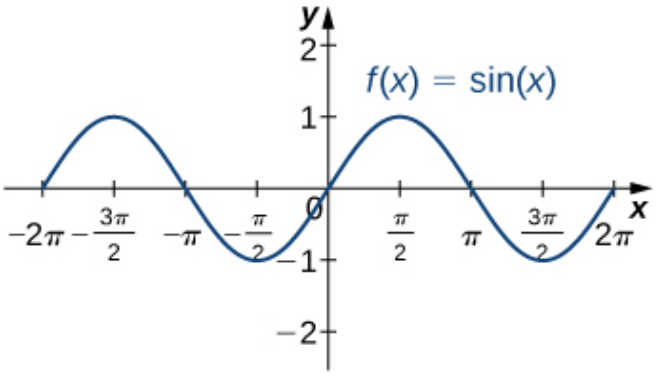
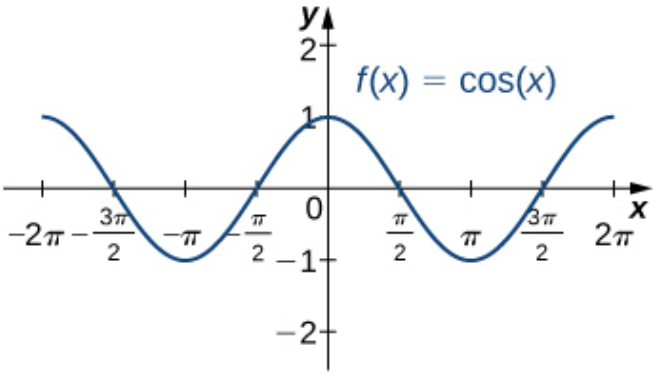
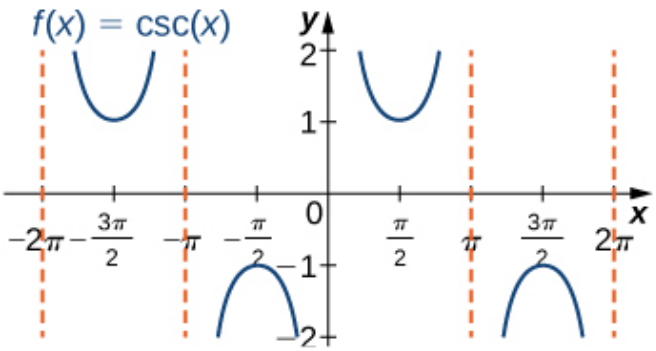
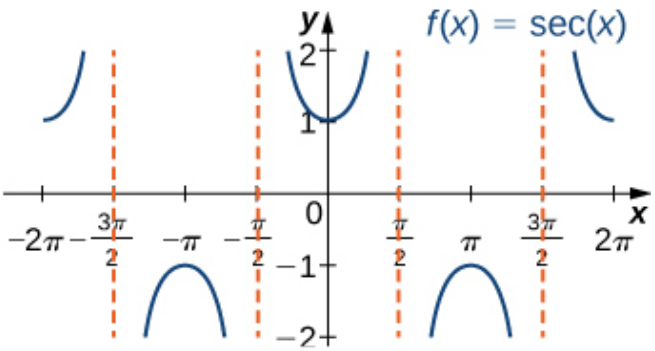






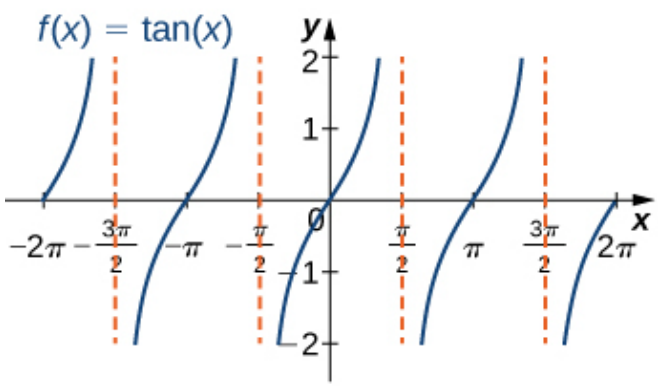


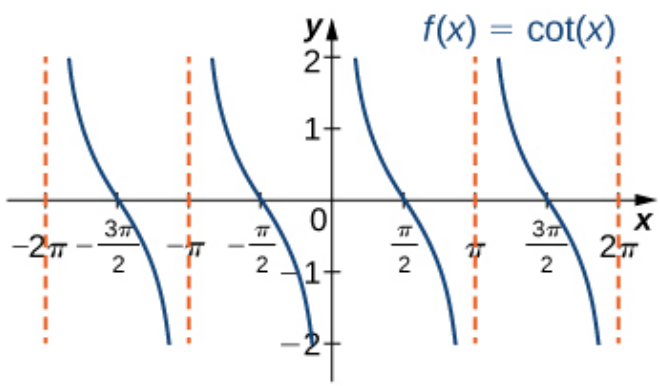
Asymptotes at:

$$x = \frac{n\pi}{k} + b$$

Asymptotes at:

$$x = \frac{\pi}{2k} + \frac{n\pi}{k} + b$$





Asymptotes at:

$$x = \frac{\pi}{2k} + \frac{n\pi}{k} + b$$

Asymptotes at:

$$x = \frac{n\pi}{k} + b$$

Pythagorean Identities

$$\sin^2(\theta) + \cos^2(\theta) = 1$$

$$\tan^2(\theta) + 1 = \sec^2(\theta)$$

$$1 + \cot^2(\theta) = \csc^2(\theta)$$

Even/Odd Formulas

$$\sin(-\theta) = -\sin(\theta) \qquad \csc(-\theta) = -\csc(\theta)$$

$$\cos(-\theta) = \cos(\theta) \qquad \sec(-\theta) = \sec(\theta)$$

$$\tan(-\theta) = -\tan(\theta) \qquad \cot(-\theta) = -\cot(\theta)$$

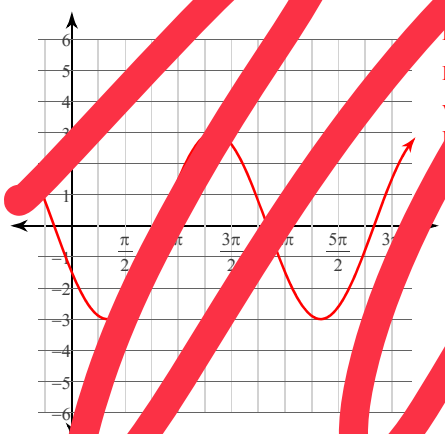
 Name_____

Graphs of Trig Functions

Date_____ Period____

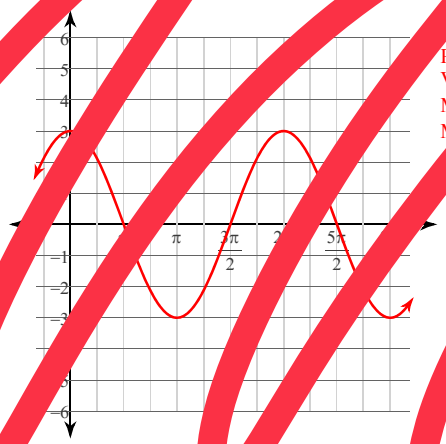
Find the amplitude, the period in radians, the phase shift in radians, the vertical shift, and the minimum and maximum values. Then sketch the graph using radians.

1) $y = 3\sin\left(\theta - \frac{5\pi}{6}\right)$



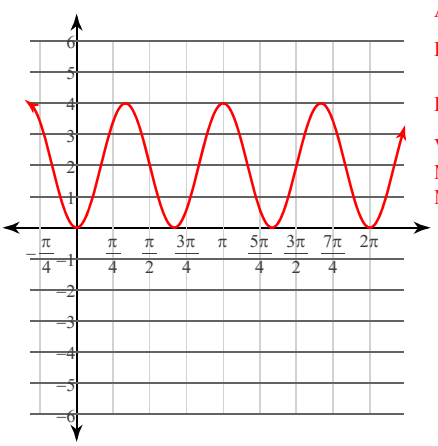
Amplitude: 3
Period: 2π
Phase shift: Right $\frac{5\pi}{6}$
Vert. shift: None
Min: −3
Max: 3

2) $y = \cos\theta$



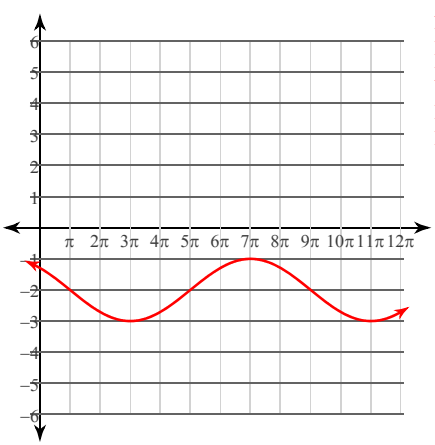
Amplitude: 3
Period: 2π
Phase shift: None
Vert. shift: None
Min: −3
Max: 3

3) $y = 2\sin\left(-3\theta - \frac{\pi}{2}\right) + 2$



Amplitude: 2
Period: $\frac{2\pi}{3}$
Phase shift: Left $\frac{\pi}{6}$
Vert. shift: Up 2
Min: 0
Max: 4

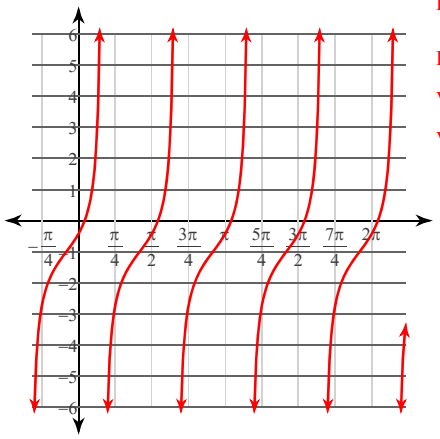
4) $y = \cos\left(\frac{\theta}{4} + \frac{\pi}{4}\right) - 2$



Amplitude: 1
Period: 8π
Phase shift: Left π
Vert. shift: Down 2
Min: −3
Max: −1

Find the period in radians, the phase shift in radians, the vertical shift, and two vertical asymptotes (if any). Then sketch the graph using radians.

5) $y = \tan\left(2\theta - \frac{11\pi}{6}\right) - 1$



Period: $\frac{\pi}{2}$

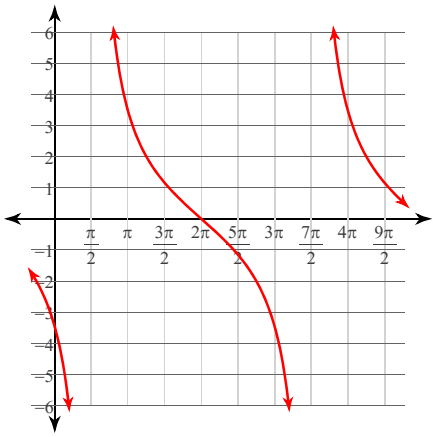
Phase shift: Right $\frac{11\pi}{12}$

Vert. shift: Down 1

Vert asym: $x = \frac{7\pi}{6}$

$x = \frac{2\pi}{3}$

6) $y = 2\cot\left(\frac{\theta}{3} + \frac{5\pi}{6}\right)$



Period: 3π

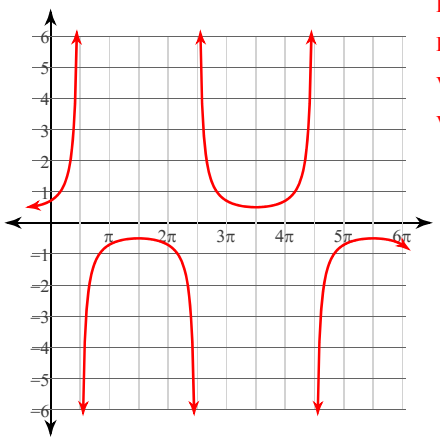
Phase shift: Left $\frac{5\pi}{2}$

Vert. shift: None

Vert asym: $x = -\pi$

$x = -4\pi$

7) $y = \frac{1}{2} \cdot \csc\left(\frac{\theta}{2} + \frac{3\pi}{4}\right)$



Period: 4π

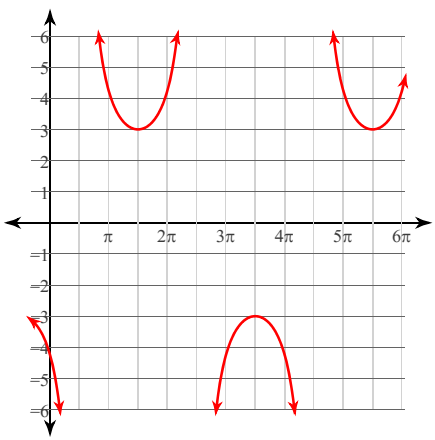
Phase shift: Left $\frac{3\pi}{2}$

Vert. shift: None

Vert asym: $x = -\frac{3\pi}{2}$

$x = \frac{\pi}{2}$

8) $y = 3\sec\left(\frac{\theta}{2} - \frac{3\pi}{4}\right)$



Period: 4π

Phase shift: Right $\frac{3\pi}{2}$

Vert. shift: None

Vert asym: $x = \frac{5\pi}{2}$

$x = \frac{\pi}{2}$

Find the transformations required to obtain the graph starting with a basic trig function.

9) $y = 5\cos\left(\theta + \frac{5\pi}{6}\right)$ Starting with $\cos\theta$, vertically stretch by 5, translate left $\frac{5\pi}{6}$

10) $y = 5 + \sin\left(\theta + \frac{3\pi}{32}\right)$ Starting with $\sin\theta$, horizontally shrink by $\frac{1}{2}$, translate left $\frac{3\pi}{32}$, translate up 5

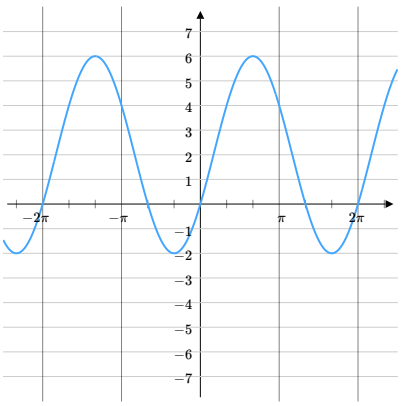
11) $y = \tan\left(\theta - \frac{\pi}{6}\right) - 2$ Starting with $\tan\theta$, translate right $\frac{\pi}{6}$, translate down 2

12) $y = \frac{1}{10} \cdot \tan\left(\theta - \frac{\pi}{3}\right)$ Starting with $\tan\theta$, vertically shrink by $\frac{1}{10}$, translate right $\frac{\pi}{3}$

Untitled assignment

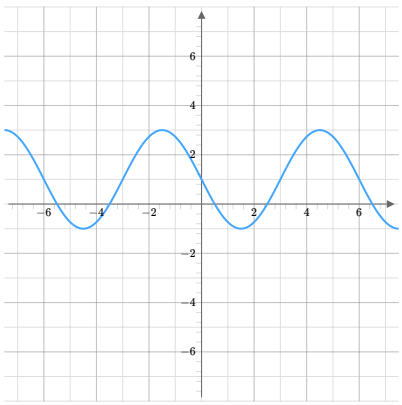
Answer key

1. Write an equation of a sine function in the form $y = A\sin(Bx + C) + D$ for the following graph.



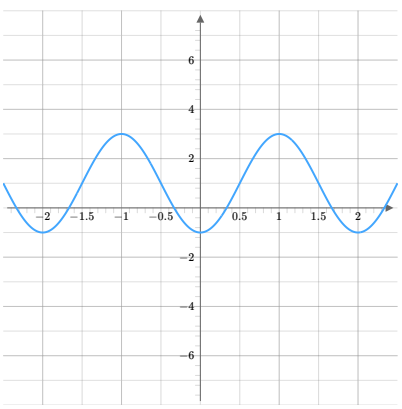
$y = 4\sin\left(x - \frac{\pi}{6}\right) + 2$

2. Write an equation of a sine function in the form $y = A\sin(Bx + C) + D$ for the following graph.



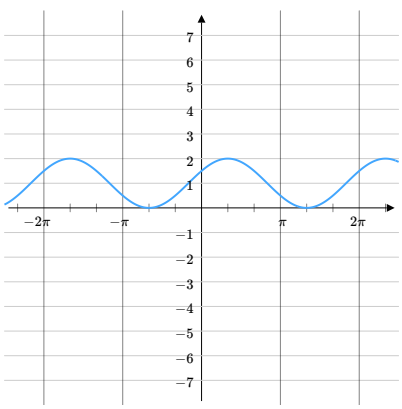
$y = -2\sin\left(\frac{\pi}{3}x\right) + 1$

3. Write an equation of a cosine function in the form $y = A\cos(Bx + C) + D$ for the following graph.



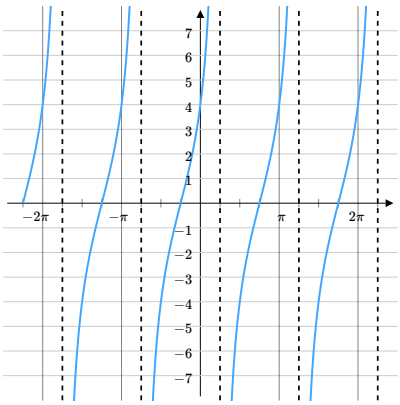
$y = -2\cos(\pi x) + 1$

4. Write an equation of a cosine function in the form $y = A\cos(Bx + C) + D$ for the following graph.



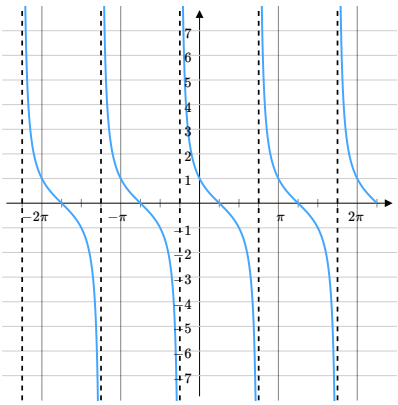
$y = \cos\left(x - \frac{\pi}{3}\right) + 1$

5. Write an equation of a tangent function in the form $y = A\tan(Bx + C) + D$ for the following graph.



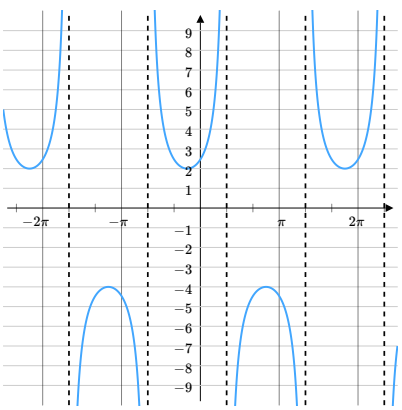
$y = 4\tan\left(x - \frac{3\pi}{4}\right)$

6. Write an equation of a tangent function in the form $y = A\tan(Bx + C) + D$ for the following graph.



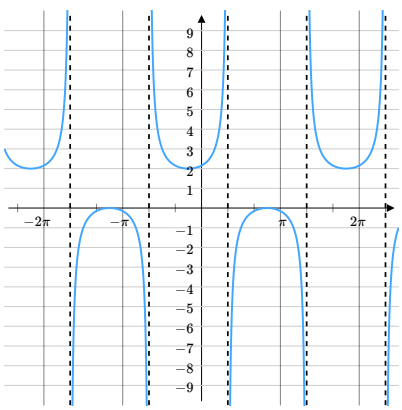
$y = -\tan\left(x + \frac{3\pi}{4}\right)$

7. Write an equation of a cosecant function in the form $y = A\csc(Bx + C) + D$ for the following graph.



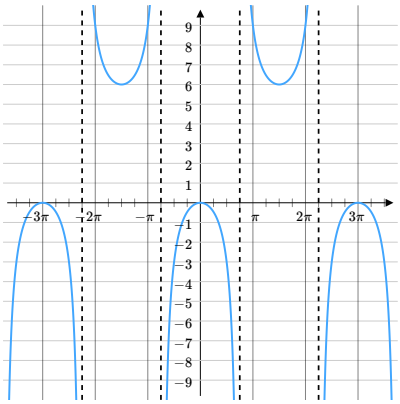
$y = 3\csc\left(x + \frac{2\pi}{3}\right) - 1$

8. Write an equation of a cosecant function in the form $y = A\csc(Bx + C) + D$ for the following graph.



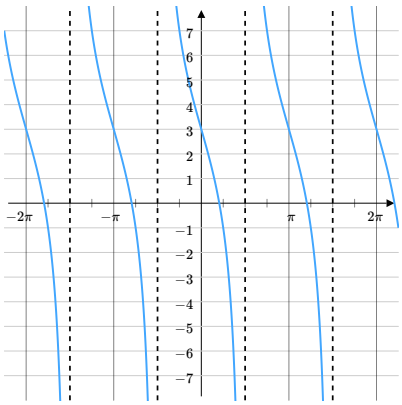
$y = \csc\left(x + \frac{2\pi}{3}\right) + 1$

9. Write an equation of a secant function in the form $y = A\sec(Bx + C) + D$ for the following graph.



$y = -3\sec\left(\frac{2}{3}x\right) + 3$

10. Write an equation of a cotangent function in the form $y = A\cot(Bx + C) + D$ for the following graph.



$y = 4\cot\left(x + \frac{\pi}{2}\right) + 3$

Convert each degree measure into radians and each radian measure into degrees.

$-\frac{\pi}{6}$ $-30°$

$-30°$ $-\frac{\pi}{6}$

$-210°$ $-\frac{7\pi}{6}$

$-160°$ $-\frac{8\pi}{9}$

$\frac{11\pi}{6}$ $330°$

$-\frac{23\pi}{6}$ $-690°$

$-930°$ $-\frac{31\pi}{6}$

$\frac{\pi}{4}$ $45°$

$-\frac{\pi}{3}$ $-60°$

$\frac{17\pi}{12}$ $255°$

In Exercises 1 – 20, find the exact value or state that it is undefined. = DNE (Does Not Exist)

1. $\tan\left(\frac{\pi}{4}\right)$ 1
2. $\sec\left(\frac{\pi}{6}\right)$ $\frac{2}{\sqrt{3}}$
3. $\csc\left(\frac{5\pi}{6}\right)$ 2
4. $\cot\left(\frac{4\pi}{3}\right)$ $\frac{1}{\sqrt{3}}$
5. $\tan\left(-\frac{11\pi}{6}\right)$ $\frac{1}{\sqrt{3}}$
6. $\sec\left(-\frac{3\pi}{2}\right)$ DNE
7. $\csc\left(-\frac{\pi}{3}\right)$ $\frac{-2}{\sqrt{3}}$
8. $\cot\left(\frac{13\pi}{2}\right)$ 0
9. $\tan(117\pi)$ 0
10. $\sec\left(-\frac{5\pi}{3}\right)$ 2
11. $\csc(3\pi)$ DNE
12. $\cot(-5\pi)$ DNE
13. $\tan\left(\frac{31\pi}{2}\right)$ DNE
14. $\sec\left(\frac{\pi}{4}\right)$ $\sqrt{2}$
15. $\csc\left(-\frac{7\pi}{4}\right)$ $\sqrt{2}$
16. $\cot\left(\frac{7\pi}{6}\right)$ $\sqrt{3}$
17. $\tan\left(\frac{2\pi}{3}\right)$ $-\sqrt{3}$
18. $\sec(-7\pi)$ -1
19. $\csc\left(\frac{\pi}{2}\right)$ 1
20. $\cot\left(\frac{3\pi}{4}\right)$ -1

In Exercises 21 – 44, find all angles which satisfy the given equation.

21. $\sin(\theta)=\frac{1}{2}$ $\frac{\pi}{6}+2n\pi$, $\frac{5\pi}{6}+2n\pi$
22. $\cos(\theta)=-\frac{\sqrt{3}}{2}$ $\frac{5\pi}{6}+2n\pi$, $\frac{7\pi}{6}+2n\pi$
23. $\sin(\theta)=0$ $n\pi$
24. $\cos(\theta)=\frac{\sqrt{2}}{2}$ $\frac{\pi}{4}+2n\pi$, $\frac{7\pi}{4}+2n\pi$
25. $\sin(\theta)=\frac{\sqrt{3}}{2}$ $\frac{\pi}{3}+2n\pi$, $\frac{2\pi}{3}+2n\pi$
26. $\cos(\theta)=-1$ $\pi+2n\pi$
27. $\sin(\theta)=-1$ $\frac{3\pi}{2}+2n\pi$
28. $\cos(\theta)=\frac{\sqrt{3}}{2}$ $\frac{\pi}{6}+2n\pi$, $\frac{11\pi}{6}+2n\pi$
29. $\cos(\theta)=-1.001$ DNE
30. $\tan(\theta)=\sqrt{3}$ $\frac{\pi}{3}+n\pi$
31. $\sec(\theta)=2$ $\frac{\pi}{3}+2n\pi$, $\frac{5\pi}{3}+2n\pi$
32. $\csc(\theta)=-1$ $\frac{3\pi}{2}+2n\pi$
33. $\cot(\theta)=\frac{\sqrt{3}}{3}$ $\frac{\pi}{3}+n\pi$
34. $\tan(\theta)=0$ $n\pi$
35. $\sec(\theta)=1$ $2nk$
36. $\csc(\theta)=2$ $\frac{\pi}{6}+2n\pi$, $\frac{5\pi}{6}+2n\pi$
37. $\cot(\theta)=0$ $\frac{\pi}{2}+n\pi$
38. $\tan(\theta)=-1$ $\frac{3\pi}{4}+n\pi$
39. $\sec(\theta)=0$ DNE
40. $\csc(\theta)=-\frac{1}{2}$ DNE
41. $\sec(\theta)=-1$ $\pi+2n\pi$
42. $\tan(\theta)=-\sqrt{3}$ $\frac{2\pi}{3}+n\pi$
43. $\csc(\theta)=-2$ $\frac{7\pi}{6}+2n\pi$, $\frac{11\pi}{6}+2n\pi$
44. $\cot(\theta)=-1$ $\frac{3\pi}{4}+n\pi$