Honors Pre-Calculus Name_____

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Summer Skill Set

Please take time over the summer to complete these problems. If you do them in the beginning of the summer, then you will need to review your work in August. If you wait until August, then just make sure to give yourself enough time to do the work. Solution videos will be available on a Youtube playlist that can be found here: shorturl.at/eqAIO

Find the reference angle. The first few are given as fractions in radian measurements, and the rest are given as decimal radian measurements.

1) $-\frac{5\pi}{3}$

2) $-\frac{11\pi}{6}$

3) $\frac{25\pi}{18}$

4) $\frac{16\pi}{9}$

5) -4.3633

6) 4.1888

7) 1.6532

8) 4.2356

9) 5.5871

10) -2.9133

Find the exact value of each trigonometric function.

11) $\csc \frac{3\pi}{2}$

12) $\sin -\frac{2\pi}{3}$

13) $\sec 2\pi$

14) $\cos -\pi$

15) $\sec -\frac{3\pi}{2}$

16) $\cos -\frac{29\pi}{6}$

17) $\cot -\frac{\pi}{6}$

18) $\tan -\frac{25\pi}{6}$

19) $\tan -\frac{14\pi}{3}$

20) $\sin -\frac{13\pi}{4}$

21) $\cot \frac{3\pi}{2}$

22) $\csc -\frac{16\pi}{3}$

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Use the given trigonometric ratio to find the ratio being asked for.

23) $\sin\theta = \frac{5}{6}$, Find $\sec\theta$.

24) $\cot\theta = 5$, Find $\csc\theta$.

25) $\sec\theta = 4$, Find $\tan\theta$.

26) $\cos\theta = \frac{3}{7}$, Find $\cot\theta$.

27) $\tan\theta = 3$, Find $\sin\theta$.

28) $\csc\theta = \frac{17}{4}$, Find $\sec\theta$.

29) $\cot\theta = \frac{9}{4}$, Find $\cos\theta$.

30) $\sin\theta = \frac{3}{8}$, Find $\tan\theta$.

Evaluate the inverse trigonometric function without using a calculator.

31) $\sin^{-1} -\frac{1}{2}$

32) $\sin^{-1} 4$

33) $\cos^{-1} -\frac{1}{2}$

34) $\cos^{-1} \frac{\sqrt{2}}{2}$

35) $\tan^{-1}\left(-\sqrt{3}\right)$

36) $\cot^{-1}\left(-\sqrt{2}\right)$

Use the properties of inverse functions to find the exact value of the expression.

37) $\cos^{-1}\left(\sin\frac{7\pi}{4}\right)$

38) $\tan^{-1}\left(\tan\frac{11\pi}{6}\right)$

39) $\cos^{-1}\left(\tan -\frac{\pi}{4}\right)$

40) $\sin(\cos^{-1}\pi)$

Solve each equation for $0 \le \theta < 2\pi$.

41) $-4 - \sin\theta = -3$

42) $-3 - 3\cos\theta = -3$

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24) $1 - \frac{1}{3} \cdot \tan\theta = 1$

25) $5 + 3\csc\theta = 11$

26) $0 = 4 + 2\sec\theta$

27) $2 + \cot\theta = 2$

28) $4\tan\left(\theta + \frac{2\pi}{3}\right) = -4\sqrt{3}$

29) $12\cot\left(\theta + \frac{11\pi}{6}\right) = 4\sqrt{3}$

30) $-6 = 3\csc\frac{\theta}{3}$

31) $-4\sin -\theta = 2\sqrt{3}$

32) $0 = 1 + \cos 2\theta$

33) $4\sqrt{3} = -4\tan -4\theta$

34) $\frac{9}{2} = 5 + \sin -4\theta$

35) $\frac{1}{4} \cdot \cos -3\theta = 0$

36) $-4\sin 3\theta = -2$

37) $-3 + \tan\frac{\theta}{4} = \frac{-9 + \sqrt{3}}{3}$

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Solve each equation for $0 \le \theta < 2\pi$. Round your answers to the nearest hundredth.All the equations in the previous section were using exact radian measures we normally work with. The equations in this section are using random decimal radians, which makes them tricky.

57) $-4.692 = -4 - \frac{1}{5} \cdot \tan\left(-3\theta + \frac{3\pi}{4}\right)$

58) $4 + \frac{3}{5} \cdot \sec\left(\frac{\theta}{3} + \frac{3\pi}{4}\right) = \frac{20 + 2\sqrt{3}}{5}$

59) $3 + \frac{1}{5} \cdot \cot\left(-\theta + \frac{5\pi}{6}\right) = 3.296$

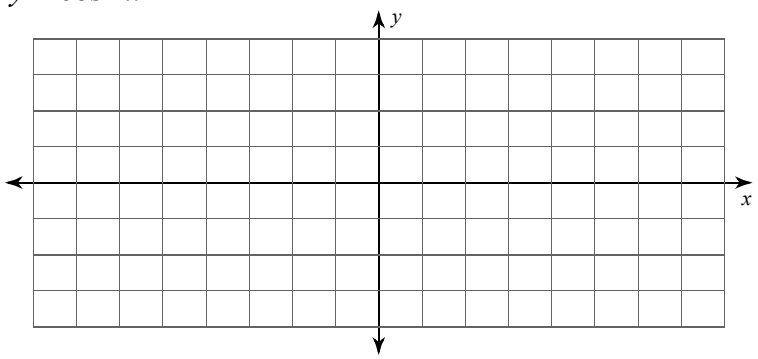
60) $-1.964 = -2 - \frac{1}{5} \cdot \cos\left(\frac{\theta}{4} + \frac{\pi}{2}\right)$

61) $\frac{17}{4} = 4 - \frac{1}{4} \cdot \sin\left(-4\theta + \frac{\pi}{6}\right)$

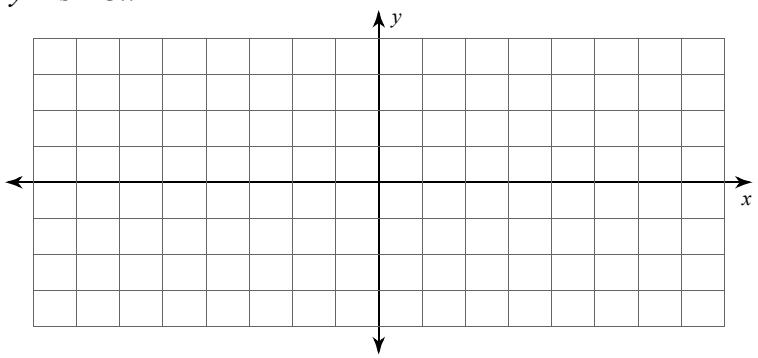
62) $-\frac{7}{5} = -1 + \frac{1}{5} \cdot \csc\left(-4\theta + \frac{7\pi}{6}\right)$

Graph the parent function and the given function on the same graph so that you can see how the period changes.

63) $y = \cos 2x$



64) $y = \sin 3x$



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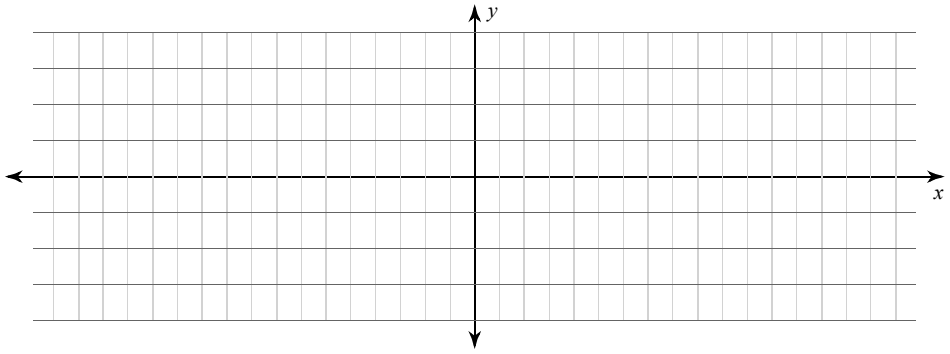
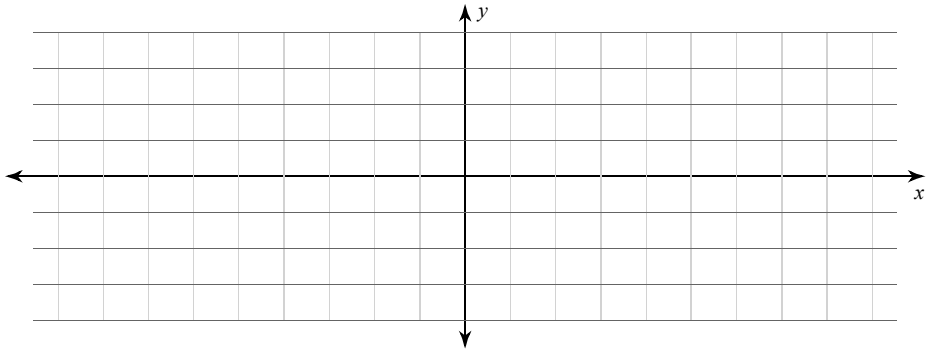
65) $y = \cos\frac{x}{4}$

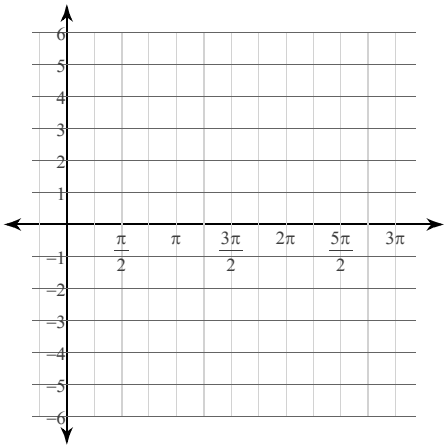


66) $y = \sin\frac{x}{3}$

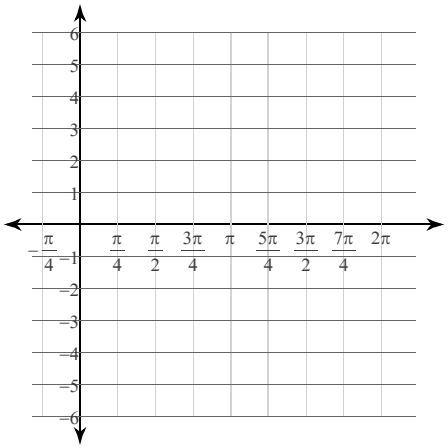


Graph each function using radians.

67) $y = 3\sin\left(\theta - \frac{4\pi}{3}\right) - 1$



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



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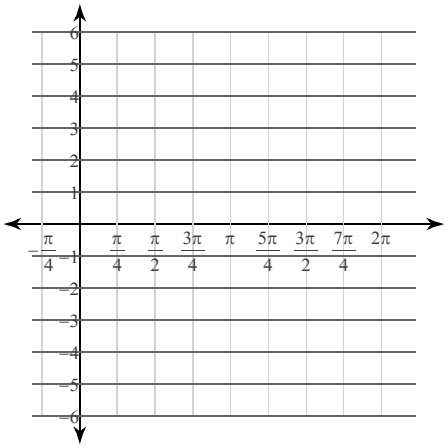
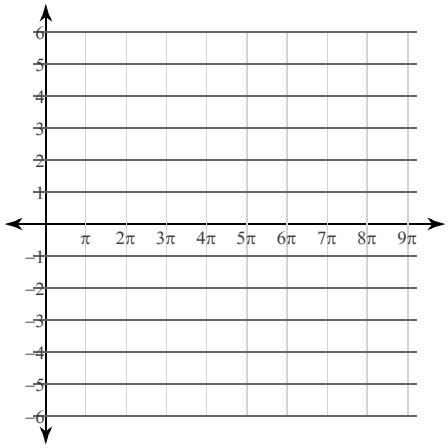
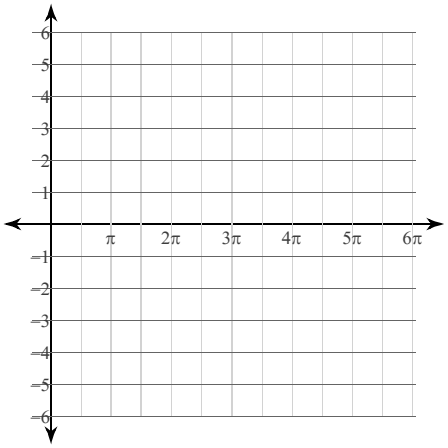
69) $y = 2 + 4\cos\left(4\theta + \frac{5\pi}{4}\right)$



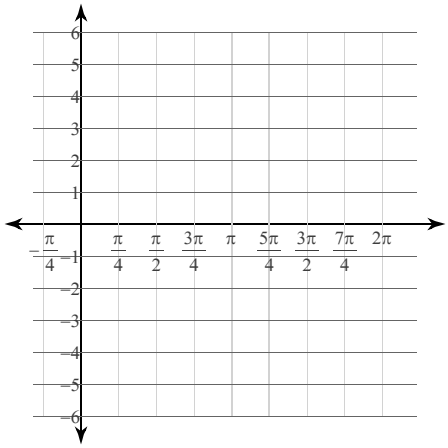
70) $y = 3\cos\left(\frac{\theta}{3} + \frac{\pi}{2}\right) - 1$



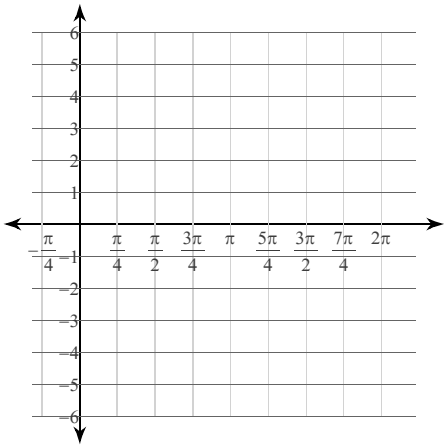
71) $y = -1 + 3\sin\left(\frac{\theta}{2} - \frac{3\pi}{4}\right)$



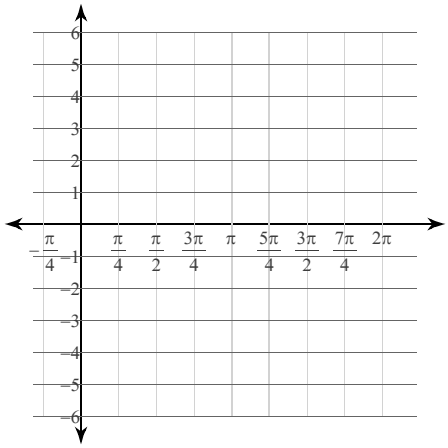
72) $y = \frac{1}{2} \cdot \tan\left(\theta + \frac{2\pi}{3}\right) - 2$



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



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



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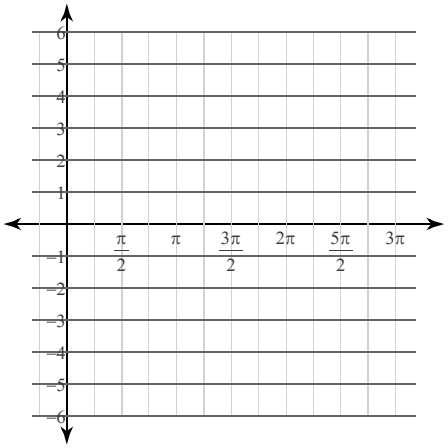
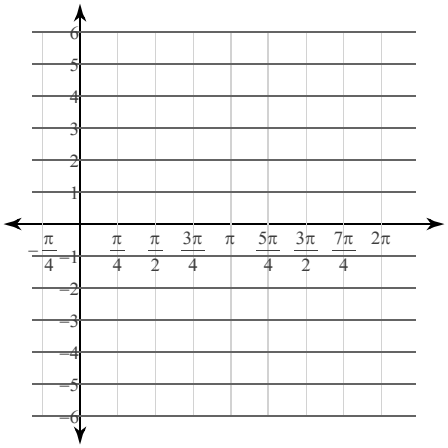
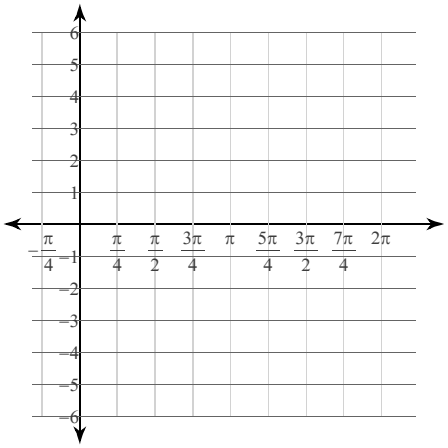
75) $y = 3\sec\left(\theta - \frac{\pi}{2}\right) - 1$



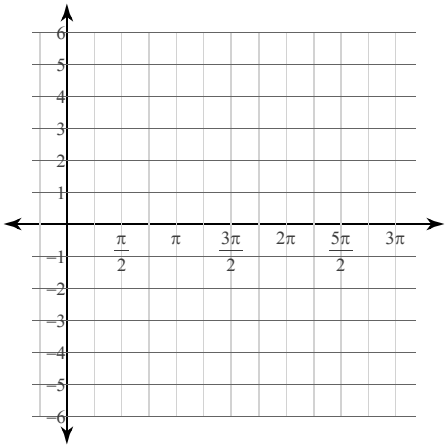
76) $y = 2 + \frac{1}{2} \cdot \sec\left(2\theta - \frac{2\pi}{3}\right)$



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



78) $y = \frac{1}{2} \cdot \cot\frac{\theta}{2}$



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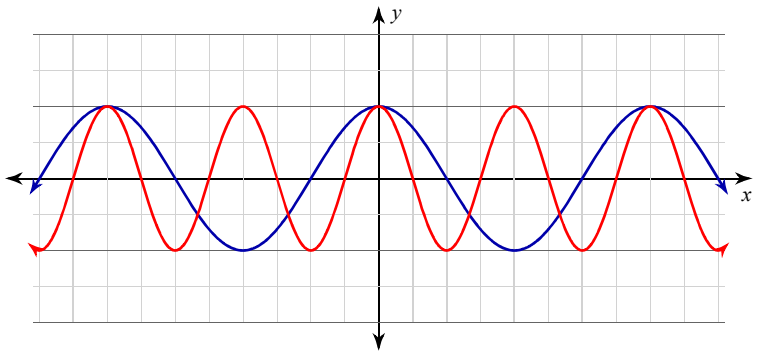
Answers to Summer Skill Set

1) $\frac{\pi}{3}$
2) $\frac{\pi}{6}$
3) $\frac{7\pi}{18}$
4) $\frac{2\pi}{9}$
5) 1.222
6) 1.0472
7) 1.4884
8) 1.094
9) 0.6961
10) 0.2283
11) -1
12) $-\frac{\sqrt{3}}{2}$
13) 1
14) -1
15) Undefined
16) $-\frac{\sqrt{3}}{2}$
17) $-\sqrt{3}$
18) $-\frac{\sqrt{3}}{3}$
19) $\sqrt{3}$
20) $\frac{\sqrt{2}}{2}$
21) 0
22) $\frac{2\sqrt{3}}{3}$
23) $\frac{6}{\sqrt{11}}$
24) $\sqrt{26}$
25) $\sqrt{15}$
26) $\frac{3\sqrt{10}}{20}$
27) $\frac{3\sqrt{10}}{10}$
28) $\frac{17\sqrt{273}}{273}$
29) $\frac{9\sqrt{97}}{97}$
30) $\frac{3\sqrt{55}}{55}$
31) $-\frac{\pi}{6}$
32) undefined
33) $\frac{2\pi}{3}$
34) $\frac{\pi}{4}$
35) $-\frac{\pi}{3}$
36) $\frac{3\pi}{4}$
37) $\frac{3\pi}{4}$
38) $-\frac{\pi}{6}$
39) $\frac{3\pi}{4}$
40) undefined
41) $\left\{\frac{3\pi}{2}\right\}$
42) $\left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$
43) $\{0, \pi\}$
44) $\left\{\frac{\pi}{6}, \frac{5\pi}{6}\right\}$
45) $\left\{\frac{2\pi}{3}, \frac{4\pi}{3}\right\}$
46) $\left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$
47) $\{0, \pi\}$
48) $\left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$
49) No solution.
50) $\left\{\frac{\pi}{3}, \frac{2\pi}{3}\right\}$
51) $\left\{\frac{\pi}{2}, \frac{3\pi}{2}\right\}$
52) $\left\{\frac{\pi}{12}, \frac{\pi}{3}, \frac{7\pi}{12}, \frac{5\pi}{6}, \frac{13\pi}{12}, \frac{4\pi}{3}, \frac{19\pi}{12}, \frac{11\pi}{6}\right\}$
53) $\left\{\frac{\pi}{24}, \frac{5\pi}{24}, \frac{13\pi}{24}, \frac{17\pi}{24}, \frac{25\pi}{24}, \frac{29\pi}{24}, \frac{37\pi}{24}, \frac{41\pi}{24}\right\}$
54) $\left\{\frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{3\pi}{2}, \frac{11\pi}{6}\right\}$
55) $\left\{\frac{\pi}{18}, \frac{5\pi}{18}, \frac{13\pi}{18}, \frac{17\pi}{18}, \frac{25\pi}{18}, \frac{29\pi}{18}\right\}$
56) $\left\{\frac{2\pi}{3}\right\}$
57) $\{0.36, 1.4, 2.45, 3.5, 4.54, 5.59\}$
58) No solution.
59) $\{2.02, 5.17\}$
60) $\{0.72\}$
61) $\{0.52, 2.09, 3.67, 5.24\}$
62) $\{0, 1.05, 1.57, 2.62, 3.14, 4.19, 4.71, 5.76\}$
63)



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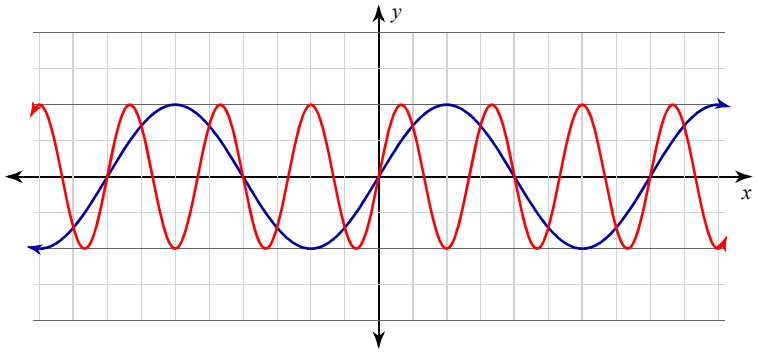
64)



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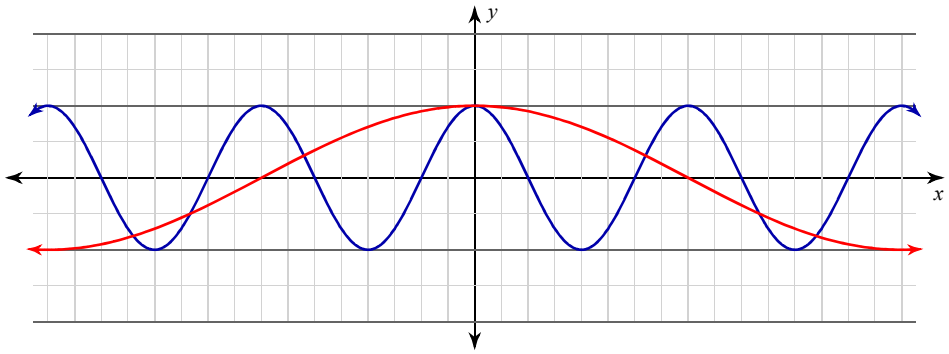

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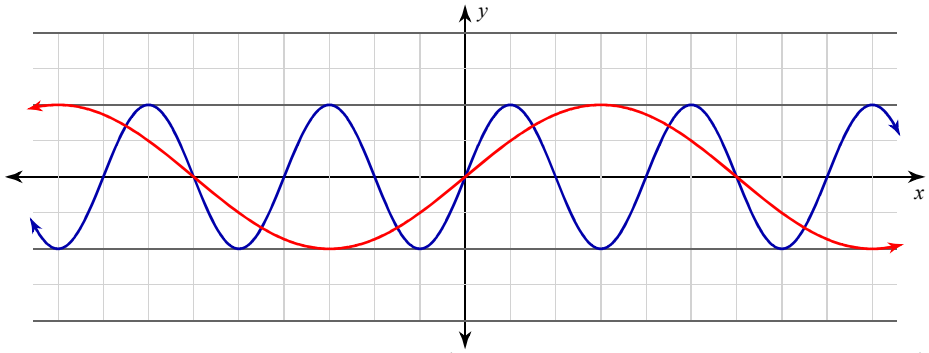

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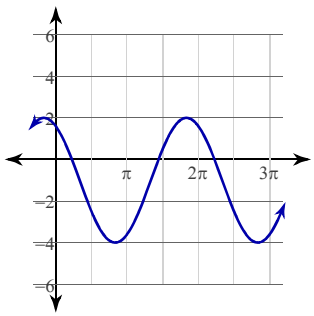

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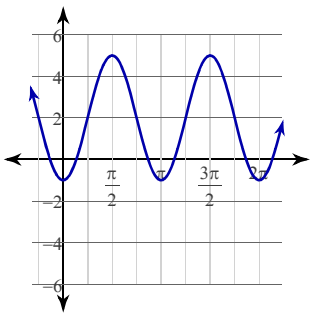

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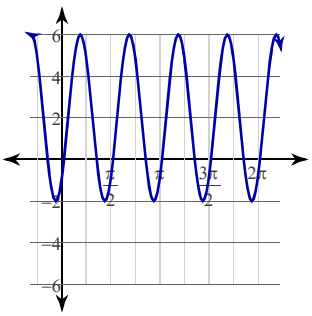

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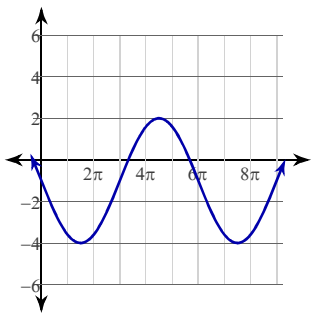

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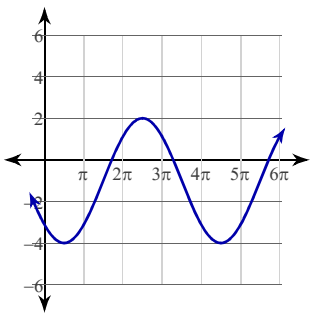

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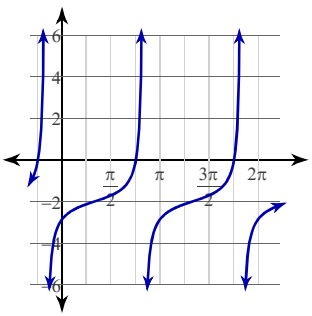

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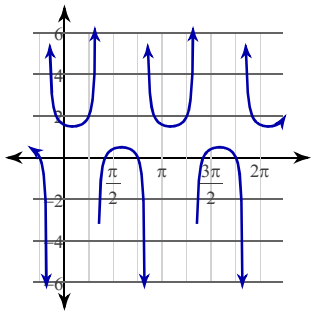

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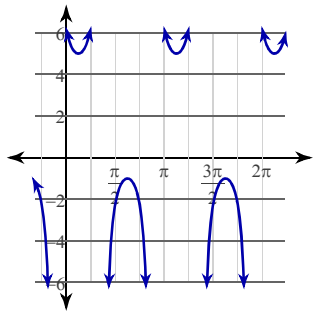

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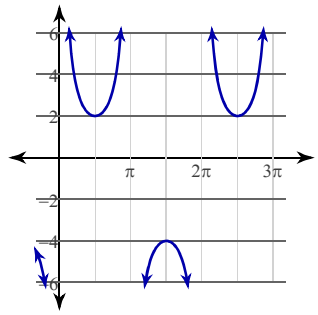

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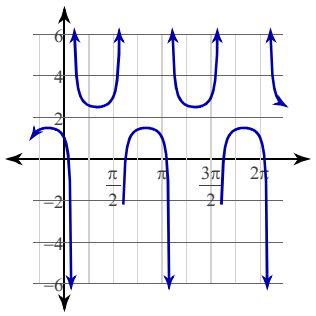

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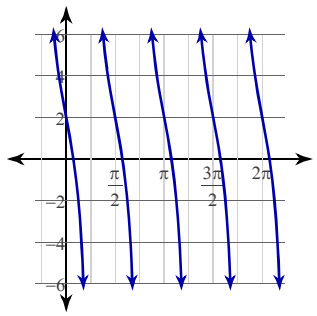

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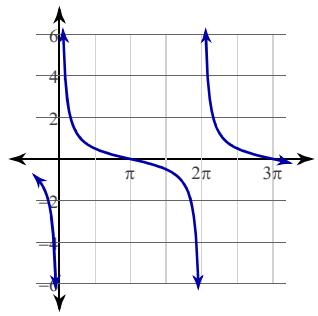

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