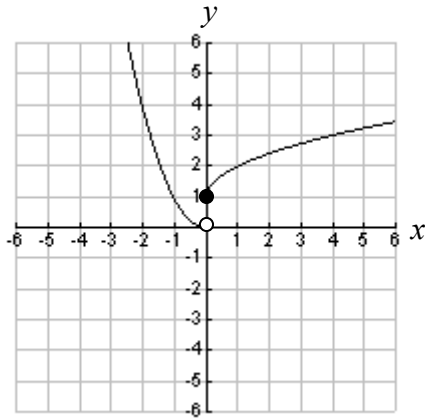


1.



2. **B**

3. **B**

4. a. odd
b. even
c. even

5. Domain: $[-6, 1) \cup (1, 4]$ Range: $[-2, 7]$

6. a. $f^{-1}(x) = x^2 - 2, x \geq 0$

b. $f^{-1}(x) = \sqrt[3]{x-4}$

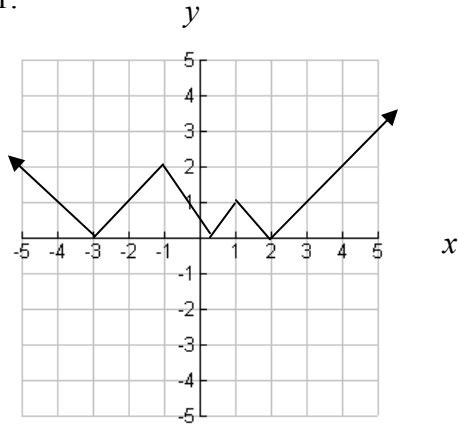
7. **C**

8. a. jump
b. infinite
c. removable

9. a. true
b. false

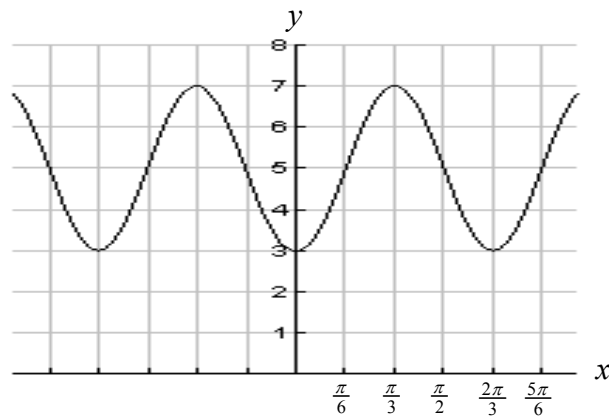
10. **A**

11.



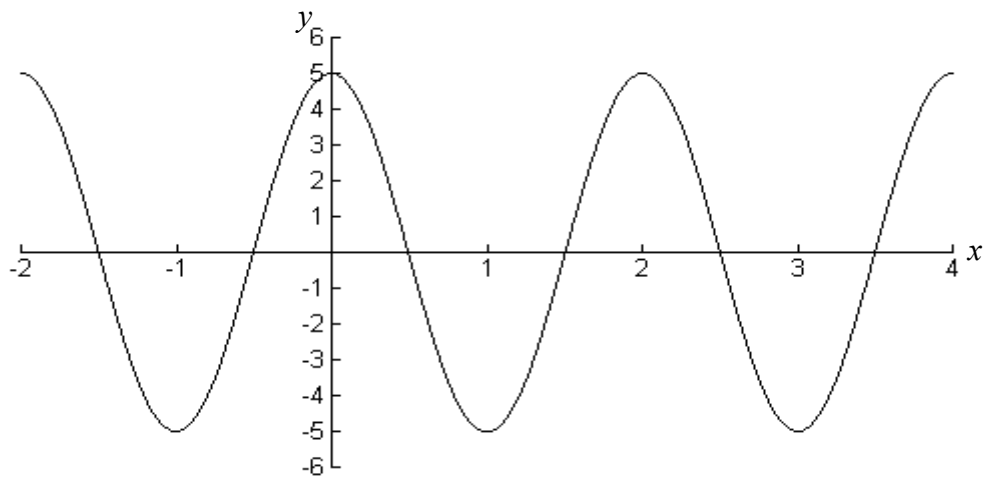
12. **B, C, A, D**

13. a. amplitude 2, period $\frac{2\pi}{3}$, phase shift $+\frac{\pi}{6}$, vertical translation +5



13.

b. amplitude 5, period 2, phase shift -1 , vertical translation 0



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

15. $\cos \theta = \frac{3}{5}, \tan \theta = -\frac{4}{3}, \cot \theta = -\frac{3}{4}, \sec \theta = \frac{5}{3}, \csc \theta = -\frac{5}{4}$

16. **B**

17. a. II

b. III

c. III

18. a. $y = 2 \sin x + 5$

b. $y = 3 \sin(\pi x)$

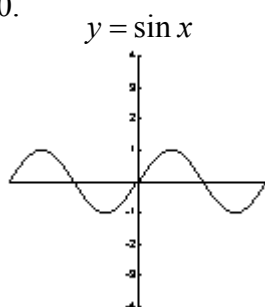
c. $y = 4 \cos\left(x - \frac{\pi}{6}\right) - 2$

19.

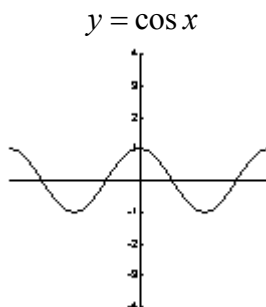
$$\sin \theta = \frac{y}{r} \quad \cos \theta = \frac{x}{r} \quad \tan \theta = \frac{y}{x}$$

$$\cot \theta = \frac{x}{y} \quad \sec \theta = \frac{r}{x} \quad \csc \theta = \frac{r}{y}$$

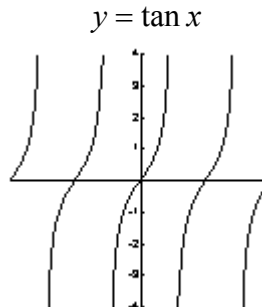
20.



$y = \cot x$

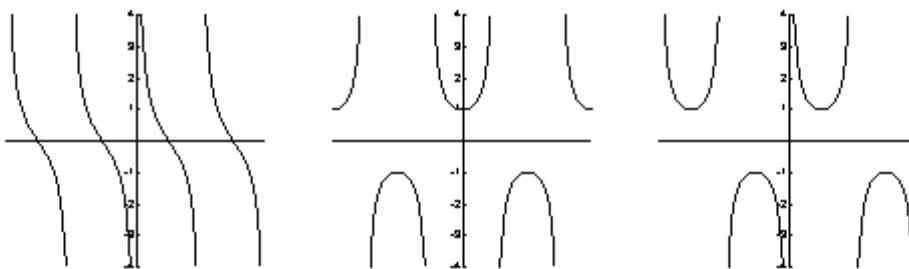


$y = \sec x$



$y = \csc x$

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21. a. $\frac{2\pi}{9}$
 b. $\frac{11\pi}{12}$

22. a. $\sin \theta = 0.6$
 b. $\cos \theta = 0.8$
 c. $\tan \theta = \frac{3}{4}$

23. a. $\text{Tan}^{-1}x$
 b. $\text{Sin}^{-1}x$
 c. $\text{Cos}^{-1}x$

	$\text{Sin}^{-1}x$	$\text{Cos}^{-1}x$	$\text{Tan}^{-1}x$
Domain	$[-1, 1]$	$[-1, 1]$	$(-\infty, \infty)$
Range	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	$[0, \pi]$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

24. a. $\frac{1}{2}$ b. $-\frac{\sqrt{2}}{2}$ c. $-\sqrt{3}$
 d. -1 e. -1 f. *undefined*
 g. 1 h. $-\frac{1}{2}$ i. $\frac{1}{2}$
 j. $\frac{\sqrt{2}}{2}$ k. $-\frac{\sqrt{3}}{2}$ l. $\frac{\sqrt{3}}{3}$

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m. $-\sqrt{2}$ n. $-\sqrt{3}$ o. $-\frac{2\sqrt{3}}{3}$

25.

a. $\frac{\pi}{6}$

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

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

d. $-\frac{\pi}{2}$

e. $\frac{\pi}{2}$

f. $-\frac{\pi}{4}$

26.

a. $\frac{1}{2}$

b. $-\frac{\sqrt{2}}{2}$

c. -1

27.

a. $\frac{5}{8}$

b. $\frac{12}{5}$

c. $\frac{\pi}{6}$

d. $-\frac{4}{5}$

28. a. $\sin \theta \cot \theta = \sin \theta \cdot \frac{\cos \theta}{\sin \theta} = \cos \theta$

b.

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

c. $\frac{1 - \sin^2 x}{\cos x} = \frac{\cos^2 x}{\cos x} = \cos x$

d. $\frac{\csc x}{1 + \cot^2 x} = \frac{\csc x}{\csc^2 x} = \frac{1}{\csc x} = \sin x$

e. $\frac{\cot \theta}{\sin\left(\frac{\pi}{2} - \theta\right)} = \frac{\frac{\cos x}{\sin x}}{\cos x} = \frac{\cos x}{\sin x} \cdot \frac{1}{\cos x} = \frac{1}{\sin x} = \csc \theta$

f.

$$\frac{\sin \theta}{\cos \theta} + \frac{\cos \theta}{\sin \theta} = \frac{\sin^2 x}{\sin x \cos x} + \frac{\cos^2 x}{\sin x \cos x} = \frac{1}{\sin x \cos x} = \frac{1}{\cos x} \cdot \frac{1}{\sin x} = \sec \theta \csc \theta$$

g.

$$\sin(x + y) + \sin(x - y) = \sin x \cos y + \cos y \sin x + \sin x \cos y - \cos y \sin x = 2 \sin x \cos y$$

h. $\cos(\pi + x) = \cos \pi \cos x - \sin \pi \sin x = -1(\cos x) - 0 \sin x = -\cos x = -\cos x$

29.

a. $\sin 2A = 2 \sin A \cos A = 2\left(\frac{5}{13}\right)\left(-\frac{12}{13}\right) = -\frac{120}{169}$

b. $\cos 2A = \cos^2 A - \sin^2 A = \left(-\frac{12}{13}\right)^2 - \left(\frac{5}{13}\right)^2 = \frac{119}{169}$

30. a. $\theta = 225^\circ, 315^\circ$

b. $\theta = 120^\circ, 240^\circ$

31. a. $x = \frac{3\pi}{4}, \frac{7\pi}{4}$

b. $x = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$

32. a. $\sin \frac{\pi}{4} = \frac{\sqrt{2}}{2}$

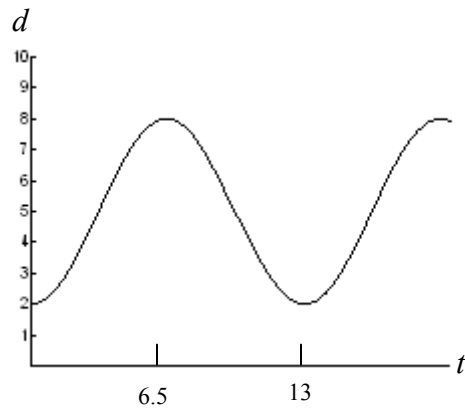
b. $\cos \pi = -1$

33. a. $h(t) = 30 \cos\left(\frac{\pi}{4}(t-3)\right) + 50$

b. $h(11.5) = 77.716$ ft

c. 1.929 sec, 4.071 sec

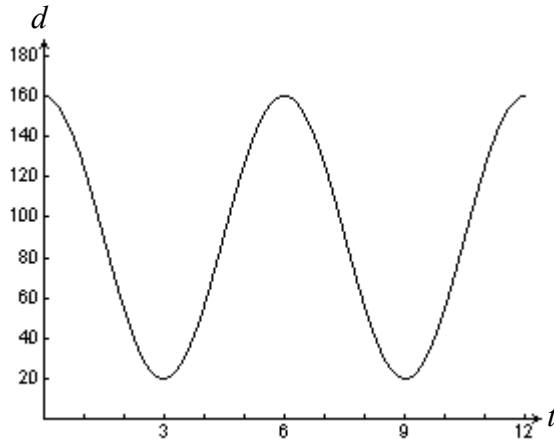
34. a.



b. $d(t) = 5 - 3 \cos\left(\frac{2\pi}{13}t\right)$

c. approximately 1:44 a.m.

37. a.



b. $d = 70 \cos\left(\frac{\pi}{3}t\right) + 90$

c. 125 cm

d. 2.260 s

36.

Radius	Angle(Radians)	Arc Length
6 inches	$\frac{\pi}{4}$	$\frac{3\pi}{2}$ inches
18 feet	$\frac{5\pi}{6}$	15π feet
10 meters	3	30 meters

37. no triangles

38. 16.915

39. 47.922°

40. a. 10

b. 105.3

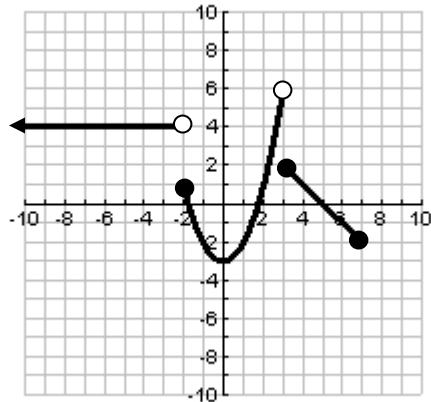
41. $m\angle B = 72.2^\circ, m\angle C = 49.8^\circ, c = 10.267$ and
 $m\angle B = 107.8^\circ, m\angle C = 14.2^\circ, c = 3.3$

42. 285.630 ft

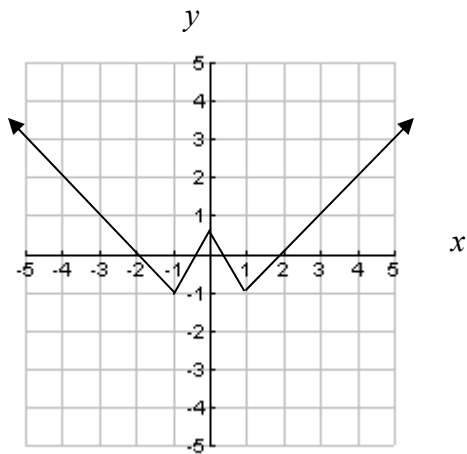
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43. 643.470 ft
44. 7391.462 ft
45. 31.114 ft
46. a. $131.8^\circ, 228.2^\circ$
b. $90^\circ, 194.478^\circ, 345.522^\circ$
47. a. 17659 sq. ft.
b. approx \$22700
48. 5.698 miles

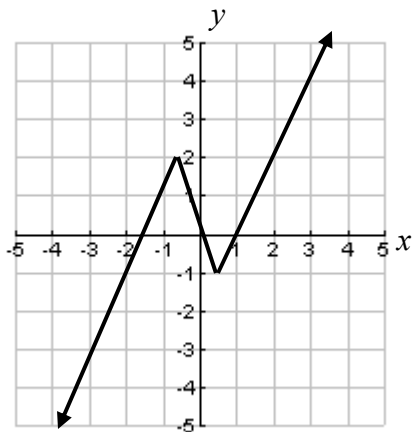
49.



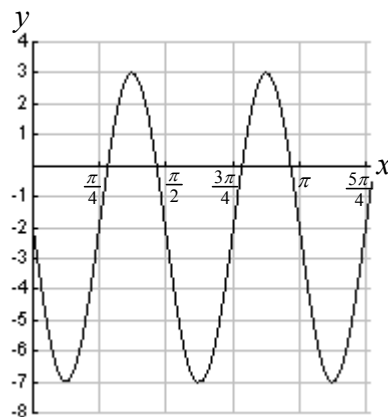
50. a.



b.



51. a. $\lim_{x \rightarrow 4^+} f(x) = 8$
- b. $\lim_{x \rightarrow 4^+} f(x) = c$, where c is any number except 8.
52. 1 triangle
53. even
54. **B**
55. a. $\frac{12}{13}$
- b. $-\frac{5}{13}$
- c. $-\frac{12}{5}$
56. yes – d, e, and j
no – a, b, c, f, g, h, i, and j
57. **D**
58. $\lim_{x \rightarrow \infty} f(x) = \frac{\pi}{2}$, $\lim_{x \rightarrow -\infty} f(x) = -\frac{\pi}{2}$
59. Amplitude 5, period $\frac{\pi}{2}$, Phase shift $\frac{\pi}{4}$ right, vertical translation – 2



$$60. \quad \text{a.} \quad \sin^2 \theta + \sin^2 \theta \tan^2 \theta = \sin^2 \theta (1 + \tan^2 \theta) = \sin^2 \theta \sec^2 \theta = \frac{\sin^2 \theta}{\cos^2 \theta} = \tan^2 \theta$$

b.

$$\tan x + \cot x = \frac{\sin x}{\cos x} + \frac{\cos x}{\sin x} = \frac{\sin^2 x + \cos^2 x}{\cos x \sin x} = \frac{1}{\sin x \cos x} = \frac{2}{2 \sin x \cos x} = \frac{2}{\sin(2x)} = 2 \csc(2x)$$

$$\text{c.} \quad \frac{\cot \theta}{\cos \theta} + \frac{\sec \theta}{\cot \theta} = \frac{\cot^2 \theta + 1}{\cos \theta \cot \theta} = \frac{\csc^2 \theta}{\cos \theta \cdot \frac{\cos \theta}{\sin \theta}} = \frac{\csc^2 \theta \sin \theta}{\cos^2 \theta} = \sec^2 \theta \csc \theta$$

$$61. \quad f^{-1}(x) = \frac{2x+4}{x-1}$$

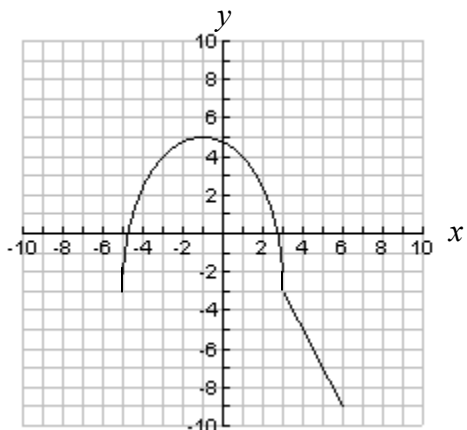
$$62. \quad \text{a.} \quad y = \pm\sqrt{17}, \pm 4, \pm 3$$

b. No, as shown above there are two values of y for every value of x in the domain.

$$\text{c.} \quad y = \pm\sqrt{17-x}$$

63. a. Stretch vertically by a factor of 2, translate 1 unit to the right and 3 units downward.

b.



c. Domain: $-5 \leq x \leq 6$

d. Range: $-9 \leq y \leq 5$

64. $x = \frac{7\pi}{12}, \frac{11\pi}{12}, \frac{19\pi}{12}, \frac{23\pi}{12}$

65. a. $\sin\left(\frac{\theta}{2}\right) = +\sqrt{\frac{1 - \left(-\frac{15}{17}\right)}{2}} = +\sqrt{\frac{\frac{32}{17}}{2}} = +\sqrt{\frac{16}{17}} = \frac{4}{\sqrt{17}}$

b. $\cos\left(\frac{\theta}{2}\right) = -\sqrt{\frac{1 + \left(-\frac{15}{17}\right)}{2}} = -\sqrt{\frac{\frac{2}{17}}{2}} = -\sqrt{\frac{1}{17}} = -\frac{1}{\sqrt{17}}$

c. $\tan\left(\frac{\theta}{2}\right) = \frac{1 - \left(-\frac{15}{17}\right)}{-\frac{8}{17}} = \frac{\frac{32}{17}}{-\frac{8}{17}} = -4$

66. $1.68\pi \text{ cm/s} \approx 5.278 \text{ cm/s}$

67. a. $\frac{\pi}{40}$ radians per hour

b. $733.333\pi \text{ fps} \approx 2303.835 \text{ fps}$

68. 32.361 meters

69. $\angle A = 36.870^\circ$ or 143.130°