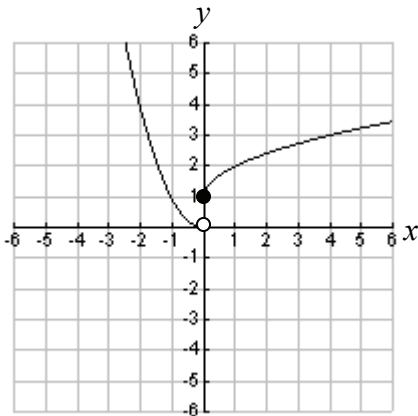
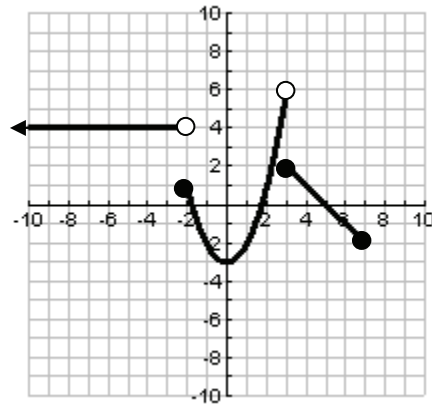


1.



2. **B**

3.



4. a. jump
 b. infinite
 c. removable

5. a. $\lim_{x \rightarrow 4^+} f(x) = 8$
 b. $\lim_{x \rightarrow 4^+} f(x) = c$, where c is any number except 8.

6. **B**

7. a. odd
 b. even
 c. even
 d. even

8. C

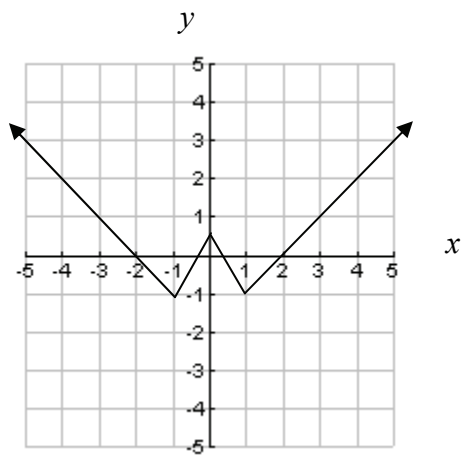
9. Domain: $[-6,1) \cup (1,4]$ Range: $[-2,7]$

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

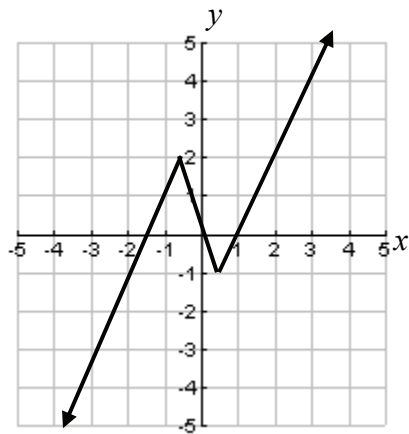
b. $f^{-1}(x) = \sqrt[3]{x-4}$

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

11. a.



b.

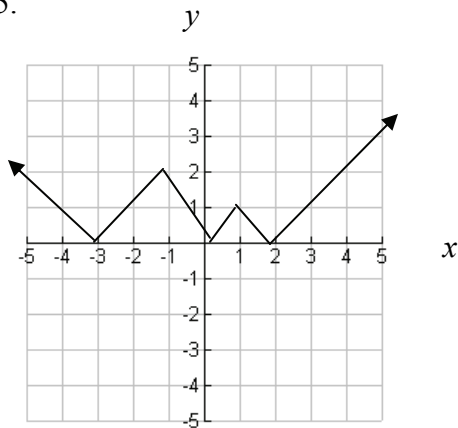


12. B, C, A, D

13. a. true
b. false

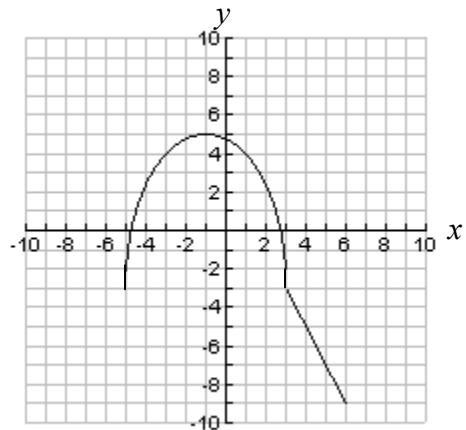
14. A

15.



16. a. Stretch vertically by a factor of 2, translate 1 unit right and 3 units down

b.



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

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

17. B

18. a. $y = \pm\sqrt{17}, \pm 4, \pm 3$

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

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

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

21. a. II

b. III

c. III

22. a. $\frac{2\pi}{9}$

b. $\frac{11\pi}{12}$

23. a. $\sin \theta = 0.6$

b. $\cos \theta = 0.8$

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

24.

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

b. $-\frac{1}{\sqrt{2}} = -\frac{\sqrt{2}}{2}$

c. $-\sqrt{3}$

d. -1

e. -1

f. *undefined*

g. 1

h. $-\frac{1}{2}$

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

j. $\frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

k. $-\frac{\sqrt{3}}{2}$

l. $\frac{1}{\sqrt{3}} = \frac{\sqrt{3}}{3}$

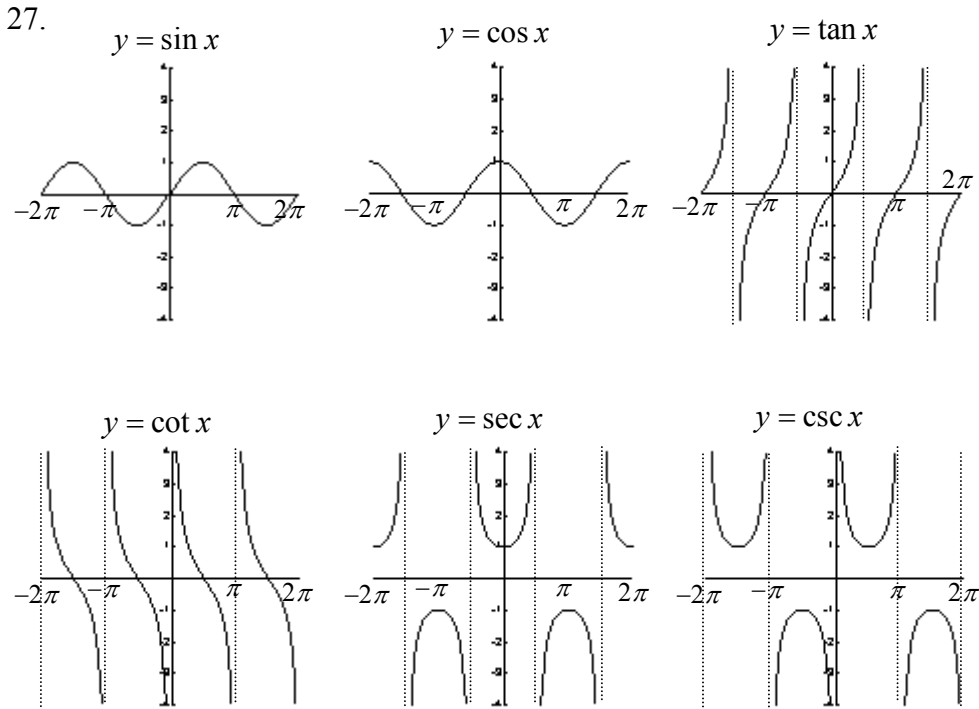
m. $-\sqrt{2}$

n. $-\sqrt{3}$

o. $-\frac{2}{\sqrt{3}} = -\frac{2\sqrt{3}}{3}$

25. a. $\frac{12}{13}$
 b. $-\frac{5}{13}$
 c. $-\frac{12}{5}$

26. yes – d, e, h and j
 no – a, b, c, f, g and i



28. **B**

29. a. i. $\tan^{-1}x$ ii. $\sin^{-1}x$ iii. $\cos^{-1}x$

b.

	$\sin^{-1}x$	$\cos^{-1}x$	$\tan^{-1}x$
Domain	$[-1, 1]$	$[-1, 1]$	$(-\infty, \infty)$
Range	$\left[-\frac{\pi}{2}, \frac{\pi}{2}\right]$	$[0, \pi]$	$\left(-\frac{\pi}{2}, \frac{\pi}{2}\right)$

30. $\lim_{x \rightarrow \infty} f(x) = \frac{\pi}{2}$, $\lim_{x \rightarrow -\infty} f(x) = -\frac{\pi}{2}$

31.

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

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

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

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

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

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

32.

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

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

c. -1

33.

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

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

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

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

34.

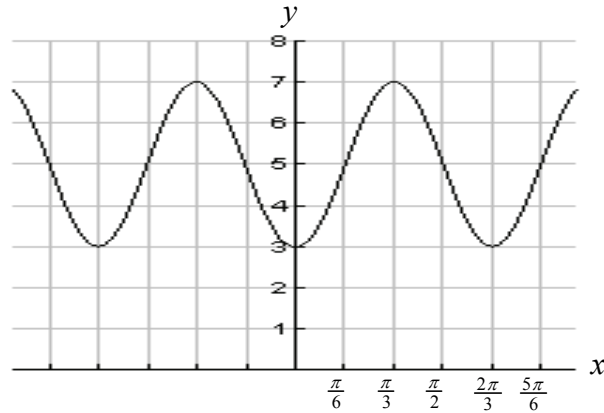
a. $y = 2 \sin x + 5$

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

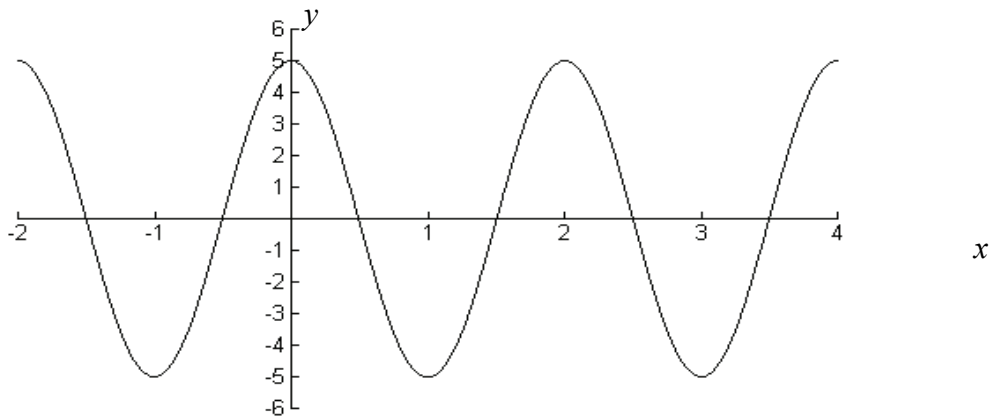
c. $y = 4 \cos\left(x - \frac{\pi}{6}\right) - 2$

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

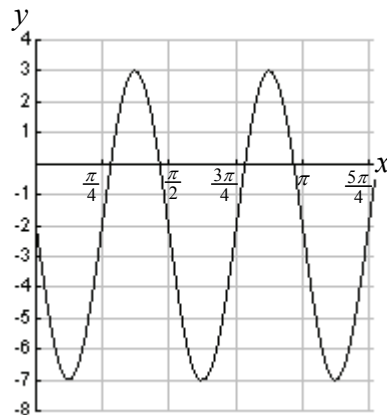
36a. amplitude 2, period $\frac{2\pi}{3}$, phase shift right $\frac{\pi}{6}$, vertical translation up 5



36b. amplitude 5, period 2, phase shift left 1, vertical translation 0



36c. Amplitude 5, period $\frac{\pi}{2}$, Phase shift $\frac{\pi}{4}$ right, vertical translation down 2



37. **D**

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

b. $\cos \pi = -1$

39.

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

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

40. a. $\sin \left(\frac{\theta}{2} \right) = +\sqrt{\frac{1 - \left(-\frac{8}{17} \right)}{2}} = +\sqrt{\frac{\frac{25}{17}}{2}} = +\sqrt{\frac{25}{34}} = \frac{5}{\sqrt{34}}$

b. $\cos \left(\frac{\theta}{2} \right) = -\sqrt{\frac{1 + \left(-\frac{8}{17} \right)}{2}} = -\sqrt{\frac{\frac{9}{17}}{2}} = -\sqrt{\frac{9}{34}} = -\frac{3}{\sqrt{34}}$

c. $\tan \left(\frac{\theta}{2} \right) = \frac{1 - \left(-\frac{8}{17} \right)}{-\frac{15}{17}} = \frac{\frac{25}{17}}{-\frac{15}{17}} = -\frac{25}{15} = -\frac{5}{3}$

41.

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

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

e.

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

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

g.

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

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

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

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

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

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

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

44. 1 triangle

45. $1.68\pi \text{ m/s} \approx 5.278 \text{ m/s}$

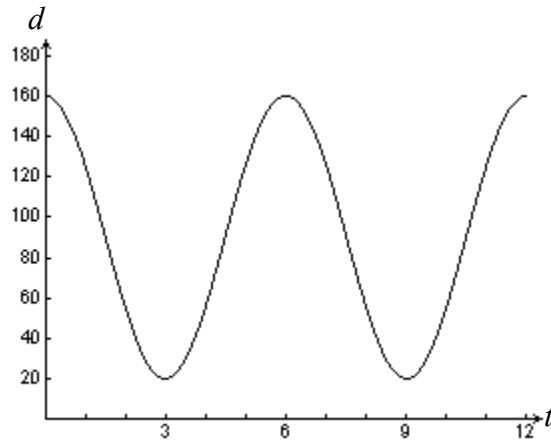
46. a. $\frac{\pi}{40}$ radians per hour

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

47.

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

48. a.



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

c. 125 cm

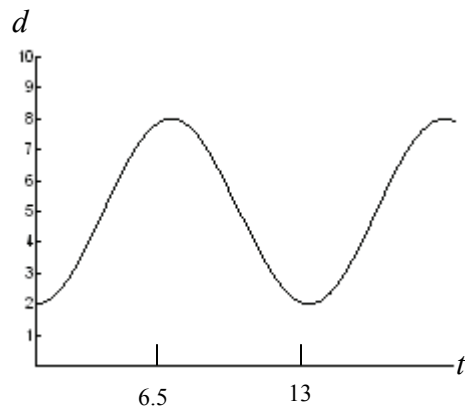
d. 2.260 s

49. a. $h(t) = 30 \cos\left(\frac{\pi}{4}(t-3)\right) + 50$ (other answers are acceptable)

b. $h(11.5) = 77.716$ ft

c. 1.929 sec, 4.071 sec

50. a.



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

c. approximately 1:44 a.m.

51. a. $131.81^\circ, 228.19^\circ$
b. $199.471^\circ, 340.529^\circ$
52. no triangles
53. 16.915
54. 47.922°
55. $m\angle B = 72.212^\circ, m\angle C = 49.788^\circ, c = 10.266$ and
 $m\angle B = 107.788^\circ, m\angle C = 14.212^\circ, c = 3.3$
56. 285.630 ft
57. 643.470 ft
58. 7391.462 ft
59. 31.114 ft
60. 5.698 miles
61. a. 10
b. 105.3
62. a. 17658.952 sq. ft.
b. \$22702.05
63. $\angle A = 36.870^\circ$ or 143.130°
64. 32.361 meters