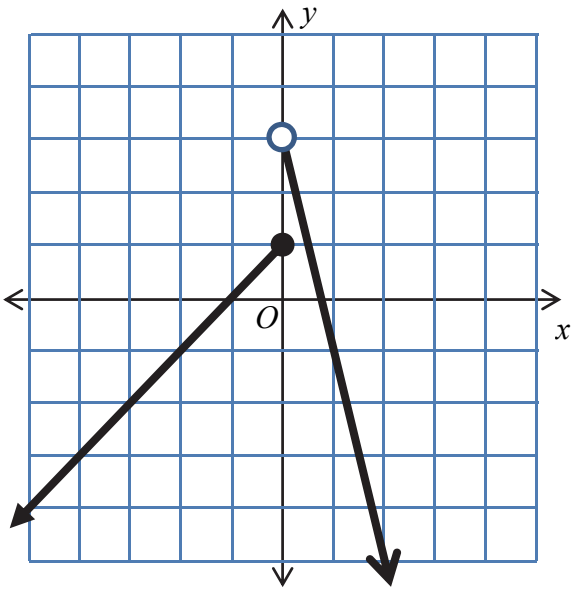
1.



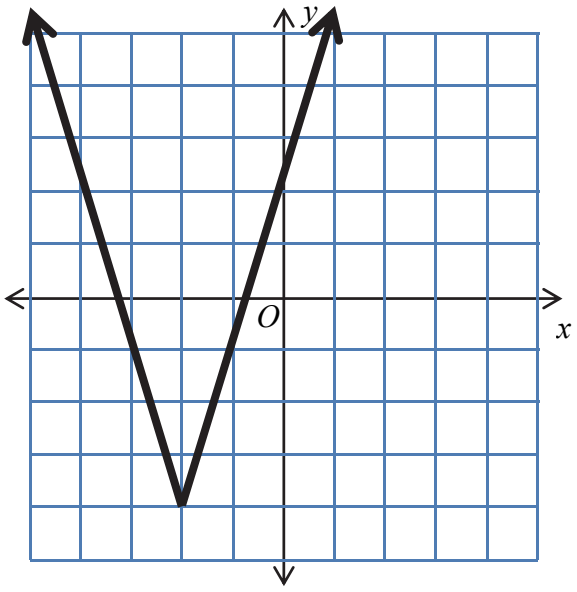
2. $f(x)=\begin{cases}3-x, & \text{if } x<0\\ x+1. & \text{if } x\geq 0\end{cases}$

3. $f(x)=\begin{cases}x+2, & \text{if } x<1\\ [x], & \text{if } x\geq 1\end{cases}$

4. a. $G(x)=\begin{cases}12+5x, & \text{if } 1\leq x\leq 5\\ 12+4.50x, & \text{if } 6\leq x\leq 9 \text{ or } 5<x<10\\ 12+3.50x, & \text{if } x\geq 10\end{cases}$

b. 8 items

5. a.



5. b. all real numbers

   c. $g(x) \geq 4$

   d. $(-2, -4)$

   e. $x = -2$

   f. -4

   g. The graph of $f(x)$ is dilated by a factor of three (vertical stretch), translated two units left and four units down.

   h. yes

6. $f(g(3)) = -5$

7. $h(f(-7)) = 98$

8. $f(x) + g(x) = 3x - 11$

9. $f(x) - g(x) = -x + 5$

10. $f(x) \cdot g(x) = 2x^2 - 14x + 24$

11. a. $\dfrac{f(x)}{g(x)} = \dfrac{x-3}{2x-8}$

    b. all real numbers except 4

12. $g(h(x)) = 2x^2 - 12$

13. $h(f(x)) = x^2 - 6x + 7$

14. a. $-2 \leq x \leq 2$

    b. $-4 \leq x \leq 4$

15. is one-to-one

16. is not one-to-one

17. is not one-to-one

18. is not one-to-one

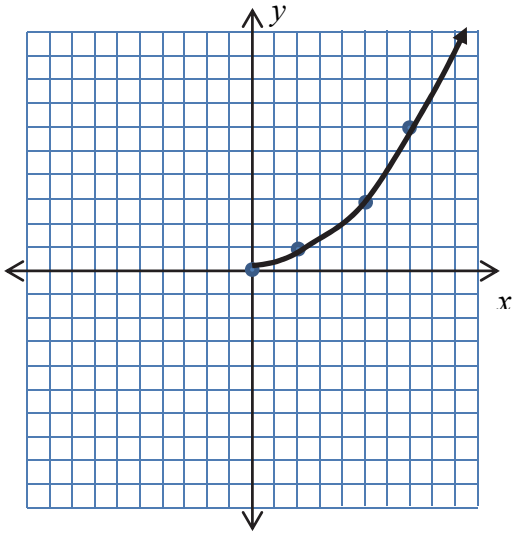
19. yes. To verify, you must show that $f\left(g\left(x\right)\right)=g\left(f\left(x\right)\right)=x$

20. **D**

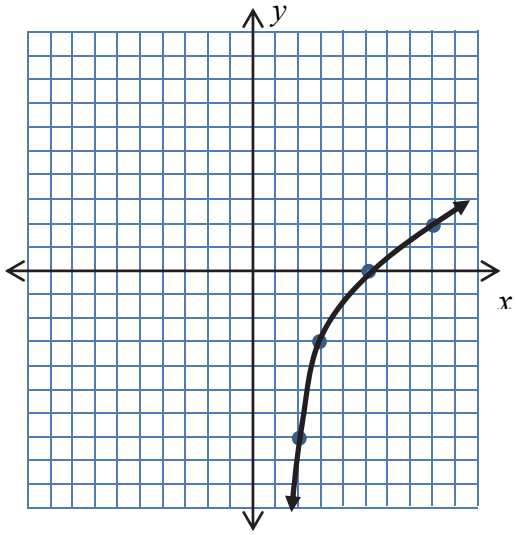
21. $g^{-1}\left(x\right)=\dfrac{x+10}{9}$

22. $\left(y,x\right)$

23.



24.



25. $x\geq -3$

26. Translate the graph of $f\left(x\right)$ two units to the left and up one unit.

27. Dilate the graph of $f\left(x\right)$ by a factor of five (vertical stretch), translate one unit to the right and down nine units.

28. a. $g\left(x\right)=-f\left(\dfrac{1}{3}x\right)$

b. $h\left(x\right)=f\left(-x\right)-5$

c. $j\left(x\right)=6f\left(x+7\right)$

29. $x = 5,\ y = 1,\ z = 4$

30. $x = 2,\ y = -1,\ z = 3$

31. $x = 3,\ y = 2,\ z = 1$

32. $x = 2,\ y = 7,\ z = -1$

33. a. Let x represent the cost of one burger.
Let y represent the price of one fry.
Let z represent the price of one shake.

$$4x + y + 2z = 20$$
$$2x + 2y + 2z = 18$$
$$4x + 3y + z = 25$$

b. Each burger is \$4, each fry is \$2 and each shake is \$3.

34. 1.214

35. $A: -4,\quad B: 4i,\quad C: 5 + i,\quad D: 4 - 3i,\quad E: -2 - i$

36. a. complex and real

b. complex and pure imaginary

c. complex

37. $8 - 5i$

38. $-1 - 11i$

39. 68

40. $-45 - 28i$

41. $-\frac{7}{5} + \frac{14}{5}i$

42. $\frac{44}{37} - \frac{5}{37}i$

43. $\sqrt{13}$

44. 13

45. 9

46. $\frac{121}{4}$

47. If the discriminant is positive, there are two distinct real roots. If the discriminant is zero, there is one real (double) root, and if the discriminant is negative, there are two complex conjugate roots.

48. $x = \frac{3}{2} + \frac{i\sqrt{35}}{2}, \frac{3}{2} - \frac{i\sqrt{35}}{2}$

49. $x = -\frac{1}{6} + \frac{i\sqrt{23}}{6}, -\frac{1}{6} - \frac{i\sqrt{23}}{6}$

50. a. grid in 4

b. grid in 80

c. grid in 81

51. on the interval $x \le 0$ or $(-\infty, 0]$

52. left-end behavior: as $x \to -\infty$, $f(x) \to -\infty$

right-end behavior: as $x \to \infty$, $f(x) \to \infty$

53. left-end behavior: as $x \to -\infty$, $f(x) \to -\infty$

right-end behavior: as $x \to \infty$, $f(x) \to -\infty$

54. a. left-end behavior: as $x \to -\infty$, $f(x) \to \infty$

right-end behavior: as $x \to \infty$, $f(x) \to \infty$

b. left-end behavior: as $x \to -\infty$, $f(x) \to -\infty$

right-end behavior: as $x \to \infty$, $f(x) \to \infty$

c. left-end behavior: as $x \to -\infty$, $f(x) \to -\infty$

right-end behavior: as $x \to \infty$, $f(x) \to -\infty$

d. left-end behavior: as $x \to -\infty,\ f(x) \to \infty$

right-end behavior: as $x \to \infty, f(x) \to -\infty$

55. $y = (x+2)(x-3)(x-6)$

56. $y = x(x+5)(x-4)$

57. $(7x-5)(49x^2+35x+25)$

58. $(x+4)(x^2-4x+16)$

59. $x = \frac{2}{5}, -\frac{1}{5}+\frac{\sqrt{3}}{5}i, -\frac{1}{5}-\frac{\sqrt{3}}{5}i$

60. $x = -\frac{3}{4}, \frac{3}{8}+\frac{3\sqrt{3}}{8}i, \frac{3}{8}-\frac{3\sqrt{3}}{8}i$

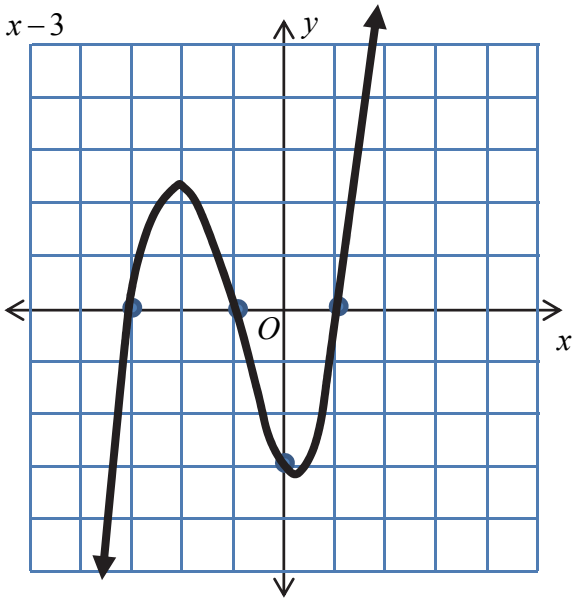
61. $P(x) = (x-3)(x+9i)(x-9i)$

62. $P(x) = (x-8)(x-7i)(x+7i)(x-5i)(x+5i)$

63. a. yes b. no c. no d. no e. yes f. yes

64. $2x^2 + x - 3$

65. a.



b. left-end behavior: as $x \to -\infty, f(x) \to -\infty$

c. right-end behavior: as $x \to \infty, f(x) \to \infty$

66. a. yes b. yes c. yes d. no e. no

67. $\pm 1, \pm 2, \pm 4, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{4}{5}$

68. 0, 2, or 4 imaginary roots

69. a. four

b. two

70. a. **D**

b. **B**

71. $x \le -4, -1 \le x \le 3, x \ge 7$

72. $x < -3, 1 < x < 5$

73. a. $(x+6)(x+1)(x-8)$

b. $x \le -6, -1 \le x \le 8$

74. a. $(x+3)(x-4)(x-7)$

b. $-3 \le x \le 4,\ x \ge 7$

75. $-2 < x < 0,\ x > 6$

76.

Function	Value(s) of any local maximums	Value(s) of any local minimums	Interval(s) where the function is increasing	Interval(s) where the function is decreasing
$f(x) = \frac{x^3}{3} + 3x^2 + 5x$	8.333	–2.333	$x \le -5$ $x \ge -1$	$-5 \le x \le -1$
$g(x) = \frac{x^4}{4} - \frac{2x^3}{3} - \frac{5x^2}{2} + 6x + 4$	7.083	–8.667 1.75	$-2 \le x \le 1$ $x \ge 3$	$x \le -2$ $1 \le x \le 3$

77. a. $f(t) = -16t^2 + 50t + 400$

b. 344 feet

c. 6.801 seconds

78. a. cubic

b. $f(x) = x^3 + x^2 - x + 4$

79. a. quadratic

b. $f(x) = x^2 + 2x + 3$

80. $y = 0.4(x+3)^2 - 2$

81. $y = 3(x-1)^2 + 4$