ANSWERS

1. $\dfrac{25}{9}$

2. (a) $\dfrac{9}{25}$ (b) $\sqrt{63}$ (c) $\dfrac{a}{b^{33/8}}$

3. $a\sqrt[6]{a}$

4. 6

5. a) $\dfrac{2x}{y}\sqrt[3]{2x^2\,y^2}$ b) $\dfrac{2+x-3\sqrt{x}}{4-x}$

6. $\dfrac{-2}{(x-2)(a-2)}$

7. $\dfrac{3x(2x+3)}{(x+3)(2x-3)}$

8. $\dfrac{2(3x+1)}{x}$

9. $\dfrac{2x^2+7x+15}{x^2+10x+7}$

10. $\left\{-\dfrac{26}{9}\right\}$

11. $\left\{-\dfrac{17}{7}\right\}$

12. $w=\dfrac{S-2hl}{2l+2h}$

13. $\left\{\dfrac{5}{3},\dfrac{-3}{2}\right\}$

14. $\left\{\dfrac{7\pm\sqrt{109}}{10}\right\}$

15. $\{-.59,\,2.26\}$

16. (a) $\{1, 81\}$ (b) $\left\{\pm\dfrac{\sqrt{5}}{5}, \pm\dfrac{\sqrt{6}}{2}\right\}$

17. $(3, \infty)$

18. $\left[\dfrac{-13}{2}, 6\right)$

19. $(-\infty, -6) \cup (4, \infty)$

20. $\left(-4, -\dfrac{7}{3}\right) \cup [2, 5]$

21. $(-\infty, -1.11] \cup [.35, 3.43]$

22. a) x- intercepts: ± 2 b) x-intercept: -3
        y- intercept: none   y-intercept: -6

23. $(x + 2)^2 + (y - 5)^2 = 13$

24. $(1, 4)$

25. Graph has y-axis symmetry
26. Graph has x-axis symmetry

27. $-1/5$; $-a^2 - 4a$; $-2x - h - 2$

28. a) -1.8 b) -1.5, 1.7
29. Yes

30. Domain $(-\infty, -1) \cup (-1, \infty)$
      Range $(-\infty, -3] \cup [0, \infty)$
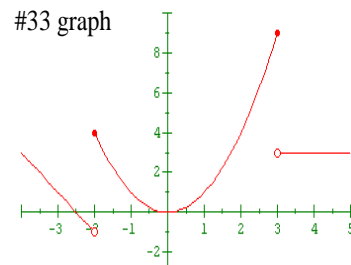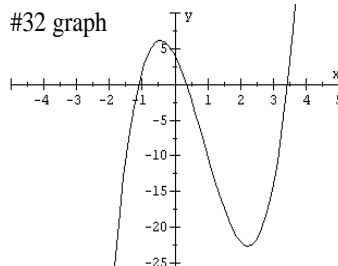
31. $[5/2, 7) \cup (7, \infty)$

32. Increasing: $(-\infty, -.45) \cup (2.23, \infty)$
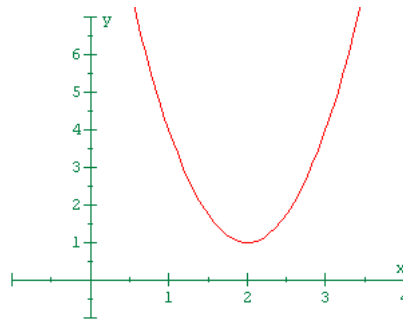   Decreasing: $(-.45, 2.23)$

33. Window [-4,5] by [-5,10]

34. $y = -\dfrac{5}{8}x - \dfrac{41}{8}$

35. $y = -4x + \dfrac{51}{2}$

#32 graph

#33 graph

36. Vertical stretch factor of 3
    Horizontal shift 2 right
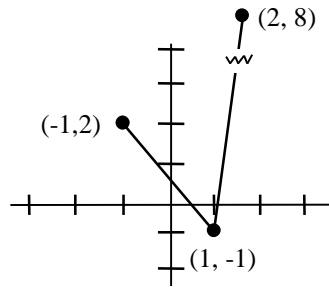   Vertical shift 1 up

37. a) $y = 2\left(x - \dfrac{7}{4}\right)^2 - \dfrac{25}{8}$; Vertex $\left(\dfrac{7}{4}, -\dfrac{25}{8}\right)$ b) Line of symmetry $x = \dfrac{7}{4}$ c) Range: $\left[-\dfrac{25}{8}, \infty\right)$

   d) Minimum

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

39. a) $\sqrt{x-1} + x^2 + 2$ b) 54   c) $\sqrt{26}$ d) $\sqrt{x^2 + 1}$
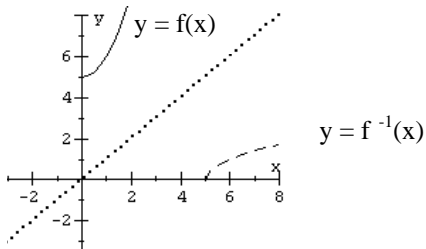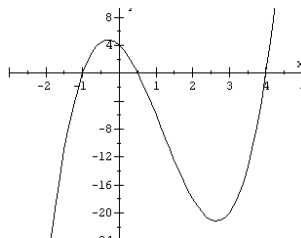
40.

41. $y = -2(x + 3)^2 - 5$

42. No

43. Domain: $[0, \infty)$
    Range: $[3, \infty)$

44. $f^{-1}(x) = \dfrac{5x + 3}{2 - x}$

45.

46. a) See sketch
    b) Local Max. = (-.31, 4.82)
       Local Min. = (2.65, -21.19)
    c) Increasing (-∞, -.31) ∪ (2.65, ∞)
       Decreasing (-.31, 2.65)

47. Odd

48. Quotient = $4x^2 + 5x + 15$; remainder = 47

49. $f(-1) = 7$ ∴ remainder = 7

50. $Q(x) = x + 2$; $R(x) = 4x + 13$

51. Yes

52. $k = -\dfrac{11}{5}$

53. $f(x) = a(x + 2)(x - 3)(x - 4 - i)(x - 4 + i)$

54. $f(x) = 2(x - 2)(x - 3) = 2x^2 - 10x + 12$

55. $-6 + 18i$

56. $-1 - i$

57. $\{-7, 1, \pm 2i\}$

58. $\{-1.44, .41, 1.70\}$

59. a) $x = -4$; $x = -1$
    b) $y = 0$
    c) Domain: $\left(-\infty, -4\right) \cup \left(-4, -1\right) \cup \left(-1, 0\right) \cup \left(0, \infty\right)$

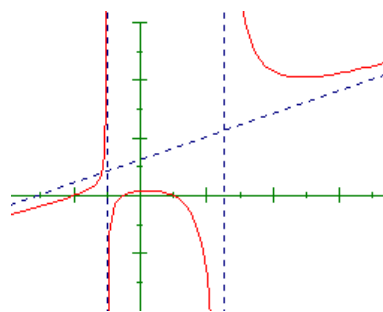60. $\left\{\dfrac{16}{7}\right\}$

61. See sketch at right

a) $\{-4, -1, 2\}$
b) y- int $= \dfrac{4}{5}$
c) V.A. $x = -2$, $x = 5$
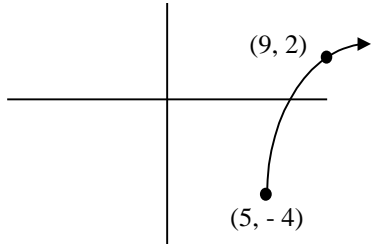d) H.A. None
e) $y = x + 6$

62. $f(x) = \dfrac{1}{24}(x-1)(x-3)(x-4)^2$

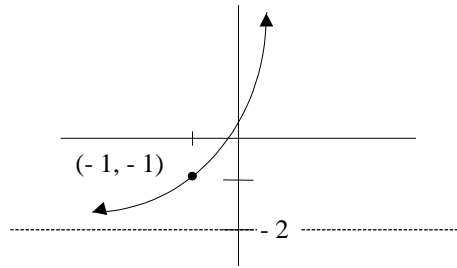63. $(-\infty,-2]\cup[2,\infty)$; $[5,\infty)$

64.   6.5

65.   { 3 }

66.

(9, 2)

(5, - 4)

67.
Domain : all reals
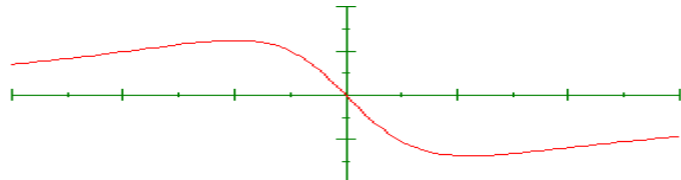Range $(-2, \infty)$
H. A. y = -2

(- 1, - 1)

- 2

68. $\left\{-\dfrac{1}{2}, 2\right\}$

69.

Max. (- 1.00 , .62)
Min.   (1.11 , - .69)
[- 3 , 3] by [- 1 , 1]

70.   a) $\varnothing$ b) { 4 }   c) { 8 }

71.   Domain: $(-1,\infty)$
       Range: all reals
       V. A.: x = -1

(24, 0)

(0, - 2)

72. $\left\{\dfrac{39}{2}\right\}$

73.   a) $3^{P} = x$ b) $\log_{3} R = Q$

74. $\log a + 2\log b - \dfrac{1}{2}\log 2 - \dfrac{1}{2}\log c$

75. $\log_4 \dfrac{x^5}{\sqrt{3x-4}\,(5x+1)^3}$

76. $\dfrac{\ln 21 - \ln 5 + \ln 4}{2\ln 4}$, or equivalent.

77. a) -6.34; b) 13.22

78. 1.76

79. (a) 3.26 (b) 3.15 (c) -2.58 (d) 1.28

80. (a) $(0,1)\cup(1,\infty)$ (b) $(-\infty,6)\cup(17,\infty)$

81. a) 2.5 inches or 7.29 inches b) 4.70 inches

82. a) $y = \dfrac{5}{x}$ b) $S = 4x + \dfrac{20}{x} + 5$

83. (a) $k \approx 0.1507$; $A(t) = 17{,}000e^{0.1507t}$ where $A(t)$ is in dollars and t is the number of years after 1952.
(b) \$479,650,669
(c) 4.6 yr
(d) 63.4 yr

84. 6.35 feet

85. $V < 31.23$ $(0, 31.23)$

86. a) 109.77 feet b) 3.40 sec.

87. 250 yd by 500 yd

88. 13,500

89. 110.02 days

90. 166

91. 8.19%

92. 5.22 years

93. (a) none
(b) quadratic or exponential

94. (a) $y = \dfrac{99.98884912}{1 + 489.2438401e^{-0.1299899024x}}$

(b) For $x = 55$, $y \simeq 72.2\%$

For $x = 100$, $y \simeq 99.9\%$

(c) $y = 99.98884912$ is the horizontal asymptote; as more and more ads run, the percent of people who buy the product approaches 100%.

95. 14 min

96. 2.1cm