1. $\frac{72}{11}$ 2. $\frac{S}{n} - \frac{(n-1)d}{2}$ 3. $x < 5$ *or* $x \geq 6$ 4. -22, 28 5. $\frac{14}{3} > x > 0$ 6. $\frac{4}{3} > x > 0$

7. $x \leq -1$ *or* $x \geq 2$ 8. $-4 \leq x \leq 0$ *or* $1 \leq x \leq 5$ 9. sometimes 10. $\frac{-48+8a-10a^2}{a^3}$

11. all real numbers ≤ 4 12. domain: all real numbers; range: $-5 \leq y \leq 5$; yes, it's a function

13. 2, -1 14. slope = $\frac{-3}{2}$, $\left(\frac{11}{3}, 0\right)$, $\left(0, \frac{11}{2}\right)$ 15. $y = \frac{-3}{2}x + \frac{13}{2}$ 16. $2x+3y=-1$

17. -130 18. (2, 3) 19. (2, -3) 20. $a = 2$, $b = -4$, $c = 1$ 21. 475 students, 325 non-students

22. $5x(x+9)(x-9)$ 23. $xy(4x-11y)^2$ 24. $3\left(x^{2n}+2\right)\left(x^n+1\right)\left(x^n-1\right)$

25. $(x+7+20y)(x+7-20y)$ 26. 0, $\frac{-2}{5}$, $\frac{5}{3}$ 27. $\frac{2 \pm 3\sqrt{7}}{5}$ 28. $\pm 2i\sqrt{3}$ 29. $\pm 2i$, 0

30. $6\sqrt{3}$ 31. $\frac{\sqrt{70}}{20}$ 32. (a) $6-3i$ (b) $-26+18i$ (c) $-32-24i$ (d) $\frac{1}{4} - \frac{3}{4}i$ (e) 5

33. 0, -6 34. $\frac{-3 \pm 2\sqrt{21}}{5}$ 35. $\frac{-\sqrt{3} \pm \sqrt{21}}{3}$ 36. (a) 1 real (double) solution

(b) 2 real rational solutions (c) 2 conjugate imaginary solutions 37. $y = -2(x-3)^2 - 5$;

vertex (3, -5); maximum value = -5 38. $-7 < x < \frac{5}{3}$ 39. distance = $\sqrt{113}$, midpoint $\left(\frac{-1}{2}, 6\right)$

40. $(x+8)^2 + y^2 = 25$ 41. $\frac{x^2}{16} + \frac{y^2}{4} = 1$ 42. a) $y = \frac{-1}{12}(x+4)^2 + 2$ b) $x = \frac{1}{20}(y+2)^2 - 2$

43. $\frac{(x-3)^2}{81} + \frac{(y+2)^2}{45} = 1$ 44. $\frac{y^2}{16} - \frac{(x-5)^2}{20} = 1$ 45. a) 1 b) 0 c) $\frac{5}{3}$ d) $\frac{3}{7}$

46. a) ellipse; $\frac{(x+2)^2}{25} + \frac{(y-3)^2}{9} = 1$; (-2, 3) b) circle; $(x-6)^2 + (y+2)^2 = 9$; (6, -2)

47. a) $\left(\frac{7}{4}, \frac{3}{4}\right)$, (-1, -2) b) $\left(\sqrt{3}, \pm 2\right), \left(-\sqrt{3}, \pm 2\right)$ 48. $\frac{1}{2x^5y^6}$ 49. $\frac{y^{2n-1}}{x^{n+3}}$

50. $6x^{2n+2} - 16x^{4n-2}$ 51. $-15x^3 + 3x^2 - 14x + 17$ 52. $162x^{2n+1} - 50x$ 53. $27x^3 - 27x^2 + 9x - 1$

54. $\left(5x^2 - 3y\right)\left(25x^4 + 15x^2y + 9y^2\right)$ 55. $2\left(16x^8+1\right)\left(4x^4+1\right)\left(2x^2+1\right)\left(2x^2-1\right)$

56. $\left(2x^2+6x+9\right)\left(2x^2-6x+9\right)$ 57. 2, $-1 \pm i\sqrt{3}$ 58. 0, $\pm 2\sqrt{2}$, $\pm\sqrt{2}$ 59. $\frac{-2}{3}, \pm\sqrt{7}$

60. $2x^3 - 3x + 2 - \frac{3}{2x^2 - 1}$ 61. $4x^3 - 3x^2 + 6x - 14 + \frac{23}{x+2}$ 62. $f(x) = 2x^5 + x^4 + 2x^3 + x^2 - 24x - 12$

63. $-1 \pm i$ 64. $\frac{-16}{81}$ 65. $5^{11/6}$ 66. $2n^2y^2\sqrt[4]{18n}$ 67. $\sqrt[4]{2}$ 68. $\frac{2\sqrt[3]{15y^2}}{3y}$ 69. $x^{59/60}$

70. $(a-2)\sqrt{5}$ 71. (a) $6x^2 - x - 22$, all real numbers (b) $6x+12$, $x \neq 2$ (c) $6x^2 - 24x$, all real

numbers 72. $f^{-1}(x) = \frac{\sqrt[3]{x+27}}{2}$ 73. $4 \pm \sqrt[4]{45}$ 74. 63 75. $\pm 2\sqrt{6}$ 76. 7, 6

77. (a) 58.2 (b) 57.5 (c) 58 (d) 21 (e) 5.2