Algebra II Midterm Review

Find each value if $f(x) = 2x - 1$ and $g(x) = 2 - x^2$. (Calculator)
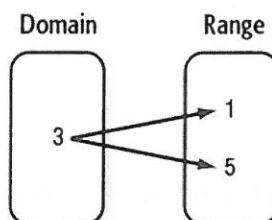
1. $f(0)$
2. $f(12)$
3. $g(4)$
4. $f(-2)$
5. $g(-2)$
6. $f(d)$
7. $f(g(3))$
8. $g(f(-1))$
9. $f(g(x))$

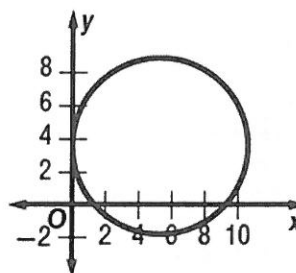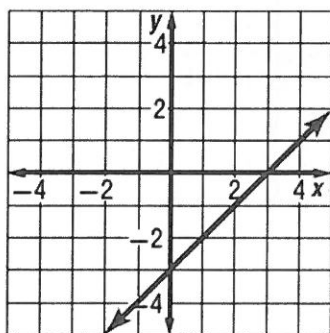**Determine whether each relation is a function. (Calculator)**

10.

Domain	Range
100 → 50	
200 → 100	
300 → 150	

11.
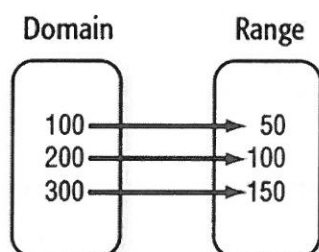
Domain	Range
3 → 1	
→ 5	

12.

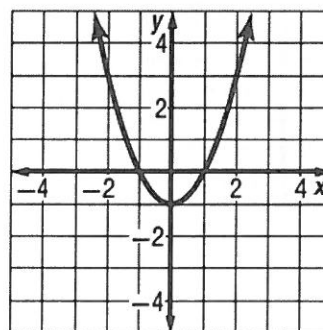| x	y
-3	0
-1	-1
0	0
2	-2
3	4

13.

Identify the type of function represented by each graph and write its equation. Also, state the domain and range. (No Calculator)
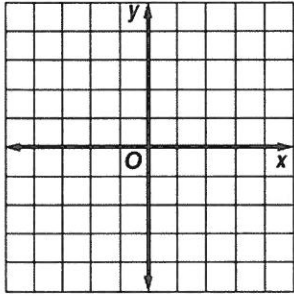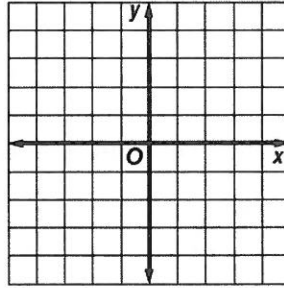
14.

15.

State the parent function, describe the translation and state the domain and range in each equation. Then graph the function. (No Calculator)
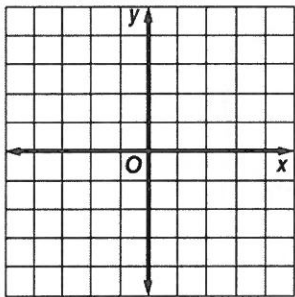
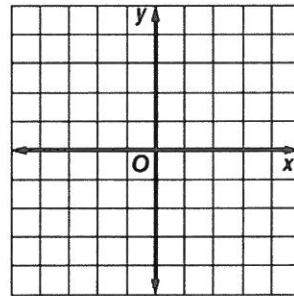16. $y = |x-1| - 2$

17. $y = (x + 1)^2$

Find the x-intercept and the y-intercept of the graph of each equation. Then graph the equation using the intercepts. (No Calculator)
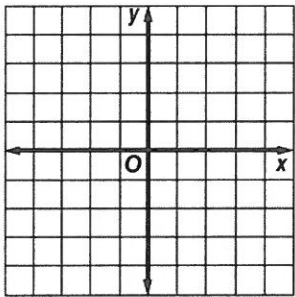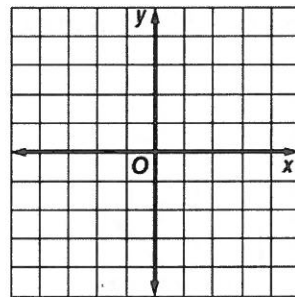
18. $y = -2x$

19. $x + y = 5$

20. $y = 3x - 4$

21. $2x + 5y = 10$

22. For the following complete parts a – c. (No Calculator)

a. Make a scatterplot and a line of fit, and describe the correlation.

b. Use two ordered pairs to write a prediction equation. (Best fit line)

c. Use your prediction equation to predict the missing value.

x	y
1	1
3	5
4	7
6	11
7	12
8	15
10	?
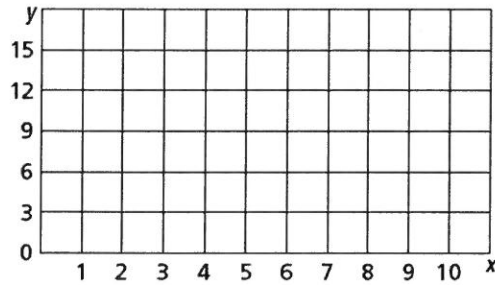
Solve the inequality and graph the solution. (Calculator)

23. $3 + 3x < 12$
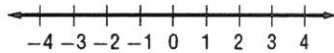
24. $2 - 3y \geq 5$

Solve each system of equations by graphing. (No Calculator)

25. $y = 4 - 3x$

$y = -\dfrac{1}{2}x - 1$

26. $3x - 2y = 4$

$2x - y = 1$
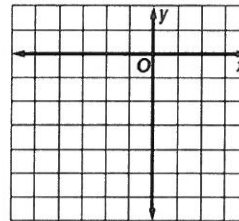
27. $y = x - 5$

$-2x + 2y = -10$
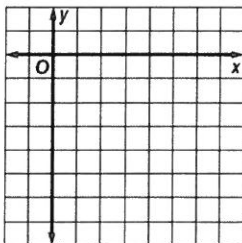
28. $y = -3x$

$y = -3x + 2$
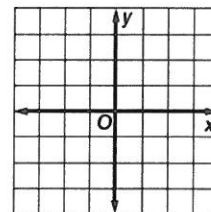
Solve each system of equations. (No Calculator)

29. $w - z = 1$
    $2w + 3z = 12$

30. $2a + 3b = 12$
    $5a - b = 13$

31. $x - y = -4$
    $3x + 2y = 7$

32. $2x - y = 12$
    $2x - y = 6$

33. $2x - y = -5$
    $-4x + 2y = 10$

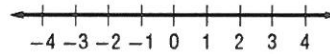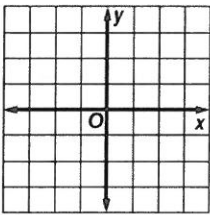34. $x + 2y + 3z = 6$
    $y + 2z = 0$
    $z = 2$

Complete parts a – c for each quadratic function. (No Calculator)
a. Find the y-intercept, the equation of the axis of symmetry, and the vertex.
b. Make a table of values that includes the vertex.
c. Use this information to graph the function.

35. $f(x) = x^2 - 6x + 8$
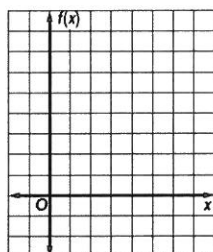
36. $g(x) = -2x^2$

Find the vertex of the quadratic function and determine if it is a maximum or minimum. (No Calculator)

37. $f(x) = 3x^2 + 12x + 3$

38. $g(x) = -8x^2$

39. $h(x) = x^2 + 2x$

40. $f(x) = -x^2 + 6x - 15$

Factor each polynomial. (No Calculator)

41. $m^2 + 7m - 18$ 42. $4x^2 + 11x + 7$ 43. $8p^2 + 12p$

44. $c^2 - 100$ 45. $x^3 - 27$

Solve each equation by factoring. (No Calculator)

46. $x^2 - 4x = 21$ 47. $x^2 + 4x + 3 = 0$

Simplify. (No Calculator)

48. $\sqrt{-36}$ 49. $(-3)(4i)(-5i)$ 50. $(-2 + 4i)(-3 + 2i)$
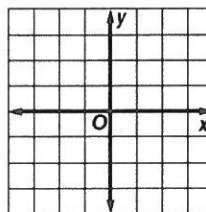
51. $(7 - 6i) + (9 + 11i)$ 52. $(4 + 3i)(2 - 5i)$

Complete parts a – b for each quadratic equation. (No Calculator)
a. Find the value of the discriminant
b. Describe the number and type of roots.

53. $x^2 - 8x + 16 = 0$ 54. $3x^2 - 2x = 0$

55. $2x^2 - 3x = -2$ 56. $5x^2 - 6 = 0$

Solve each equation. (No Calculator and Calculator)

57. $x^2 - x = 30$ 58. $3x^2 + 36 = 0$

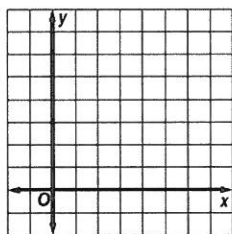59. $2x^2 - 7x + 4 = 0$ 60. $8x^2 + 1 = 4x$

Write the quadratic function in vertex form. Then identify the vertex, axis of symmetry, and direction of opening. (No Calculator)
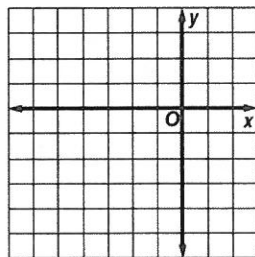
61. $f(x) = x^2 - 2x - 5$ 62. $g(x) = x^2 + 6x + 2$

Graph each function. (No Calculator)

63. $y = (x - 3)^2 - 1$

64. $y = x^2 + 6x + 4$

Write the polynomials in standard form. Then classify it by degree and number of terms. (Calculator)

65. $2b - b^4 + 5b^2$

66. $8 - 4y + y^5 - y^2$

67. $(6x^3 + 4x^2) + x^2(-3x + 7)$

Divide using synthetic division. (Calculator)

68. $(t^2 - 3t - 4) \div (t + 1)$

69. $(x^3 - 3x^2 + 4) \div (x - 2)$

70. $(3 + 7y^2 - 4y + 3y^3) \div (y + 3)$

Write the polynomial in standard form with the given zeros. (No Calculator)

71. 2, 4, 5

72. -1, -2, -3

Given the polynomials, determine the zeros and state the multiplicity. (Calculator)

73. $f(x) = x(x - 2)^3(x + 5)^2$

74. $g(x) = (x - 1)^6(x + 2)^4$

Use a graphing calculator to find the zeros of the following polynomials. (Solve the equation by graphing). (Calculator)

76. $x^3 + 6x^2 + 3x - 10 = 0$

77. $x^2 - 7x + 15 = 0$

Find the zeros and sketch each function. (No Calculator)

78. $h(x) = x(x - 2)(x + 4)$
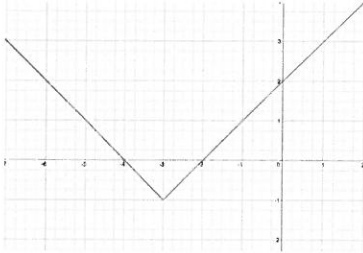
79. $g(x) = (x + 1)(x - 1)(x - 3)$

Write the equation given the parent function and the translation. (No Calculator)
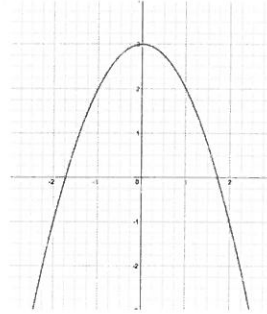
80. $y = |x|$, right 2 units, down 3 units

81. $y = x^2$, reflect over x-axis, left 5 units

State the parent function, translations and the equation of the function. (No Calculator)

82.

83.

Simplify. Assume all variables are positive. (No Calculator)

84. $\sqrt{75m^{10}n^7}$

85. $\sqrt[4]{32x^8y^{13}}$

86. $\sqrt[3]{27ab^3} \cdot \sqrt[3]{a^4b}$

87. $\sqrt{2x^3} \cdot \sqrt{4x^3}$

88. $\dfrac{\sqrt{36x^6}}{\sqrt{9x^4}}$

89. $\dfrac{\sqrt{16m^5n^{10}}}{\sqrt{2m^6n^4}}$

90. $14\sqrt[3]{xy} - 3\sqrt[3]{xy}$

91. $9\sqrt{3} + 2\sqrt{3}$

92. $4\sqrt[3]{81} + 3\sqrt[3]{24}$

93. $x^{\frac{1}{2}} \cdot x^{\frac{1}{3}}$

94. $3y^{\frac{1}{2}} \cdot y$

95. $(5)^{\frac{1}{4}} \cdot (5)^{\frac{1}{2}}$

96. $\left(\dfrac{-2p^5q^{-4}}{q^3}\right)^{-2}$

97. $\left(\dfrac{3m^2n}{m^{-1}}\right)^4$

98. $\left(x^{-3}y^{-1}\right)^{-1}\left(x^{-3}y^0\right)^2$

99. $\left(a^{-3}b^2\right)^4\left(-2a^3b^7\right)^{-2}$

100. $\sqrt{\dfrac{4}{25}}$

101. $\sqrt[3]{\dfrac{27}{64}}$

102. $4^{\frac{1}{3}} \cdot 16^{\frac{1}{3}}$

103. $3^{\frac{1}{2}} \cdot 75^{\frac{1}{2}}$

104. $8^{-\frac{2}{3}}$

105. $81^{\frac{1}{2}}$

106. $\left(27^{\frac{4}{3}}\right)^{\frac{1}{4}}$

107. $\left(16^{\frac{1}{5}}\right)^{\frac{5}{2}}$

108. $\left(1-\sqrt{5}\right)\left(2-\sqrt{5}\right)$ 109. $\left(1+3\sqrt{7}\right)\left(4-3\sqrt{7}\right)$

Write in radical form. (Calculator)

110. $x^{\frac{2}{3}}$ 111. $\left(3m\right)^{\frac{3}{5}}$

Write in exponential form. (Calculator)

112. $\sqrt[4]{p^5}$ 113. $\sqrt{s^{11}}$

Solve. (Calculator)

114. $\sqrt{x-3}=2$ 115. $\sqrt[3]{x-2}=\sqrt[3]{2x+1}$ 116. $\sqrt{x+7}=x+5$

Solve. (Calculator)

117. The expression $P(x)=2500x-2x^2$ describes the profit of a company that customizes bulldozers when it customizes x bulldozers in a month.

a. How many bulldozers per month must the company customize to make the maximum possible profit?
b. What is the maximum profit?

118. The equation for the cost in dollars of producing computer chips is:
$$C=0.000015x^2-0.03x+35$$
where x is the number of chips produced.

a. Find the number of chips that minimizes the cost.
b. What is the cost for that number of chips?

For each of the following parabolas, state the vertex, focus and equation of the directrix. Sketch the parabola. (Calculator)

119. $y=\frac{1}{16}(x-5)^2-2$ 120. $y=-\frac{1}{8}(x+1)^2+4$