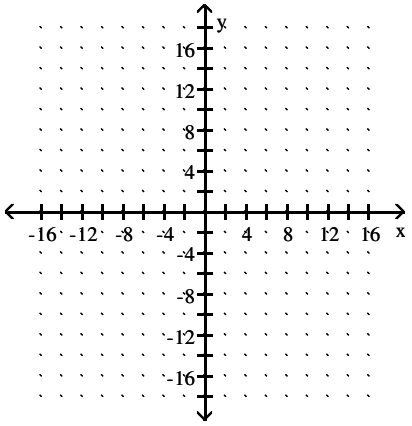
Exam 3 Final Preparation Ch 7, 9, etal v02
There will be 25 questions on Exam 3 (Final).
Twenty questions from chapters 7 & 9. Five questions from chapter 5.
No Book/No Notes/No Ipod/ No Phone/Yes Calculator/55 minutes

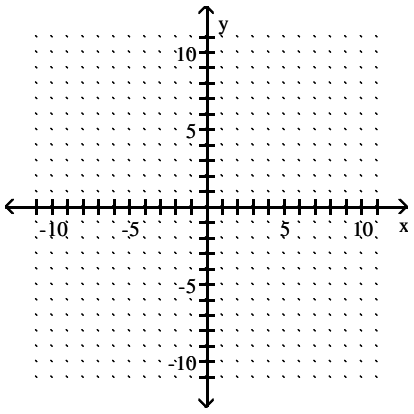
Name_____

Sketch the graph of the function and find the domain and range.

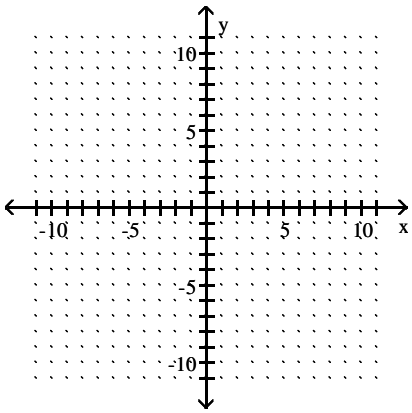
1) $f(x) = x^2 - 4$



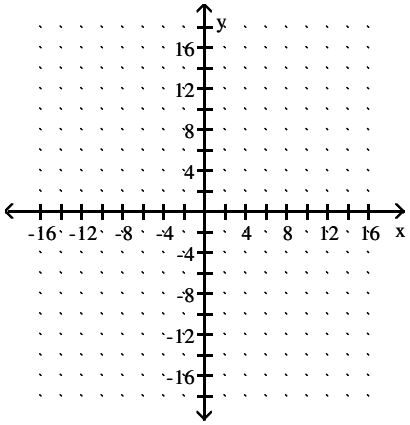
2) $f(x) = -3(x + 3)^2 - 2$



3) $f(x) = -x^2 - 2$



4) $f(x) = x^2 + 4$



Solve the problem.

5) A parabola has a y–intercept of (0, 5). The x–coordinate of its vertex is 11. Use symmetric points to find another point on the parabola.

6) Find the x–coordinate of the vertex of a parabola passing through the points (–8, –3) and (18, –3).

7) Find the x–coordinate of the vertex of a parabola passing through the points (0, –8) and (–18.8, –8).

8) Find the x–coordinate of the vertex of a parabola having x–intercepts (–9, 0) and (15, 0).

Solve.

9) $(x + 11)^2 = 2$

10) $(2x + 3)^2 = 5$

11) $\left(x + \frac{2}{5}\right)^2 = \frac{10}{25}$

12) $(m + 3)^2 - 11 = 38$

13) $5(y - 1)^2 + 11 = 75$

14) $(6x - 2)^2 - 3 = -2$

15) $5(y - 1)^2 + 15 = 96$

Simplify.

16) $\sqrt{-225}$

17) $-\sqrt{-25}$

18) $\sqrt{-280}$

19) $\sqrt{-\frac{13}{4}}$

20) $\sqrt{-\frac{5}{11}}$

21) $-\sqrt{-200}$

Find all complex number solutions.

22) $x^2 = -9$

23) $x^2 = -24$

24) $2x^2 + 26 = 0$

25) $(x - 4)^2 = -121$

26) $\left(x + \frac{4}{3}\right)^2 = -\frac{5}{9}$

27) $-2(y - 1)^2 + 17 = 66$

Find all complex–number solutions by completing the square.

28) $x^2 - 4x + 13 = 0$

29) $y^2 - 8y = -24$

30) $x^2 + x + 1 = 0$

31) $5x^2 - 5x + 3 = 0$

32) $6x^2 + 5x + 8 = 0$

33) $\frac{2}{3}p^2 - \frac{5}{3}p + \frac{4}{3} = 0$

Find the x–intercepts of the function.

34) $f(x) = x^2 - 6x - 7$

35) $g(x) = x^2 + 18x + 70$

36) $h(x) = x^2 + 12x + 12$

37) $f(x) = x^2 + 7x + 3$

38) $f(x) = x^2 + 7x + 7$

39) $f(x) = x^2 + 7x + 5$

Use the quadratic formula to solve the given equation.

40) $x^2 = 8x + 3$

41) $15x^2 = -10x$

42) $7x^2 - 13 = 0$

43) $2x^2 + 12x = -5$

44) $-3x^2 + 2x = -3$

45) $\frac{1}{2}x^2 + \frac{1}{8}x - \frac{1}{4} = 0$

Find all complex–number solutions by using the quadratic formula.

46) $y^2 - 12y = -356$

47) $x^2 + x + 5 = 0$

48) $-16x^2 = -7x + 1$

49) $6x^2 - 9x + 8 = 0$

50) $x^2 - \frac{2}{5}x = -\frac{7}{10}$

51) $-16x^2 = -5x + 1$

Solve by the method of your choice.

52) $9x^2 = 4$

53) $4x^2 - 28 = 0$

54) $2x^2 - 11x - 6 = 0$

55) $(x + 5)(x - 1) = 8$

56) $5x^2 = -8x - 1$

57) $(x + 14)(2x - 15) = 4(x - 1) - 210$

58) $m^2 = 16m - 64$

59) $5x^2 - 9x - 2 = 0$

60) $(x - 4)(2x + 3) = 4(x - 1) - 12$

61) $(x - 2)^2 = -98$

62) $-7(y - 1)^2 + 18 = 54$

63) $4x^2 - 3x = -7$

64) $(x - 3)^2 = -175$

65) $(x - 2)^2 = -245$

66) $-2(y - 1)^2 + 16 = 65$

67) $y^2 + 16y = -72$

68) $-5(y - 1)^2 + 16 = 52$

69) $-5(y - 1)^2 + 15 = 79$

Determine the number and type of solutions.

70) $x^2 + 5x + 6 = 0$

71) $x^2 + 6x + 9 = 0$

72) $8x^2 = -5x - 4$

73) $2 + 6x^2 = 3x$

74) $6 - 4x^2 = 2x + 5$

75) $3x^2 + 9x = -3$

76) $x^2 - 14x + 58 = 0$

77) $x^2 + 12x + 36 = 0$

78) $9x^2 - 71x - 8 = 0$

79) $7x^2 - 55x - 8 = 0$

80) $5x^2 + 9x + 5 = 0$

81) $6x^2 + 5x + 6 = 0$

Solve the problem.

82) The following table shows the median number of hours of leisure time per week for Americans in various years.

Year	Median Number of Leisure Hours per W
1973	26.2
1980	19.2
1987	16.6
1993	18.8
1997	19.5

Let f(t) be the median number of hours of leisure time at t years since 1973. The data can be modeled by the quadratic model $f(t) = 0.04t^2 - 1.21t + 26.03$. Use the model to estimate the year when the median number of hours of leisure time was the smallest.

83) An object is propelled vertically upward from the top of a 80–foot building. The quadratic function $s(t) = -16t^2 + 112t + 80$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. After how many seconds does the object reach its maximum height? Round to the nearest tenth of a second if necessary.

84) You have 104 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area.

85) The owner of a video store has determined that the profits P of the store are approximately given by $P(x) = -x^2 + 150x + 56$, where x is the number of videos rented daily. Find the maximum profit to the nearest dollar.

86) The daily profit in dollars of a specialty cake shop is described by the function $P(x) = -5x^2 + 220x - 1920$, where x is the number of cakes prepared in one day. The maximum profit for the company occurs at the vertex of the parabola. How many cakes should be prepared per day in order to maximize profit?

87) The sales for a gaming console for various years are listed in the table below.

Year	Sales (in billions of dollars)
1992	0.78
1994	0.38
1996	0.18
1998	0.44
1999	1.20

Let f(t) represent the sales (in billions of dollars) at t years since 1990. A reasonable model is $f(t) = 0.065t^2 - 0.68t + 1.95$. According to the model, when were sales at a minimum? What were the sales in that year?

88) Not all murder cases are solved. The percentages of murder cases solved in various years are listed in the table below.

Year	Percent of Cases Solved
1988	70
1990	67
1992	65
1994	64
1996	67
1998	69

(Source: Bureau of Justice Statistics)

Let f(t) represent the percent of murder cases solved at t years since 1980. A reasonable model is $f(t) = 0.20t^2 - 5.31t + 99.72$.. Find the approximate vertex of f. What does it mean in terms of the situation? .

Find the inverse of the given function.

89) 5^x

90) $\log_5(x)$

91) 3^x

Solve the problem.

92) An object is propelled vertically upward from the top of a 16–foot building. The quadratic function $s(t) = -16t^2 + 144t + 16$ models the ball's height above the ground, s(t), in feet, t seconds after it was thrown. After how many seconds does the object reach its maximum height? Round to the nearest tenth of a second if necessary.

93) You have 64 feet of fencing to enclose a rectangular plot that borders on a river. If you do not fence the side along the river, find the length and width of the plot that will maximize the area.

94) The owner of a video store has determined that the profits P of the store are approximately given by $P(x) = -x^2 + 90x + 58$, where x is the number of videos rented daily. Find the maximum profit to the nearest dollar.

If the expression is in exponential form, write it in radical form. If it is in radical form, write it in exponential form.

95) $x^{1/2}$

96) $x^{7/3}$

97) $\left(3x^4y^8\right)^{5/4}$

98) $\sqrt[5]{2x^8y^{13}}$

Simplify the expression. Assume that all variables are non–negative.

99) $\sqrt{8x^7y^8}$

100) $\sqrt[15]{(x^4yz^3)^5}$

101) $\sqrt{(x+2)^8}$

Simplify. Assume that each variable is nonnegative.

102) $\sqrt{4x^2} \cdot \sqrt{28x}$

103) $2\sqrt[3]{x^2}\,(\sqrt[3]{4x} - \sqrt[3]{14x^5}\,)$

104) $(\sqrt{3} + \sqrt{z})(\sqrt{3} - \sqrt{z})$

105) $(\,3 - \sqrt{x}\,)(\,4 - \sqrt{x}\,)$

106) $(\,x - \sqrt[5]{y^4}\,)(\,8x + \sqrt[5]{y^4})$

107) $(5\sqrt{x} + 2)(\sqrt{5x} - 2)$

108) $(9\sqrt{x} + 8\,)(\sqrt{x} - 6)$

Simplify the expression. Assume that all variables are non–negative.

109) $\sqrt[4]{80}$

110) $\sqrt[4]{625x^8y^{16}}$

111) $\sqrt{\sqrt[5]{xy}}$

Solve.

112) $\sqrt{x} = 4$

113) $\sqrt[3]{3x} = -6$

114) $\sqrt{x+2} = -2$

115) $-\sqrt{4x+5} = -5$

116) $\sqrt[3]{4x+5} - 3 = 0$

117) $\sqrt{7x-5} = \sqrt{6x+5}$

118) $\sqrt[3]{-9+2x} + \sqrt[3]{7+9x} = 0$

119) $\sqrt{x^2-3} = \sqrt{x+3}$

120) $\sqrt[4]{x+8} = \sqrt[4]{3x}$

121) $\sqrt{x^2+92} = 2\sqrt{5x-1}$

Find all x–intercepts.

122) $h(x) = \sqrt{8x-7} - 7$

123) $g(x) = \sqrt{7x-5} - \sqrt{6x+5}$

124) $k(x) = \sqrt{x+8} - \sqrt{x-8}$

Solve for the specified variable. Assume that the constants have values for which the equation has exactly one real–number solution.

125) $r = \sqrt{\frac{3V}{\pi h}}$, for V

126) $r = \sqrt{\frac{2A}{\theta}}$, for θ.

127) $x = \sqrt{r^2 - y^2}$, for r.

128) $q = \frac{p}{\sqrt{p^2 + 1}}$, for p.

129) $H = \frac{F}{\sqrt{F^2 + G^2}}$, for F.

Evaluate.

130) Let $g(x) = 3^x$. Find g(2)

131) Let $g(x) = 5^x$. Find $g^{-1}(125)$

132) Let $f(x) = \log_4(x)$. Find f(16)

133) Let $f(x) = \log_3(x)$. Find $f^{-1}(3)$

134) Let $f(x) = \log_5(x)$. Find $f^{-1}(2)$

Solve. If necessary, round the answer to two decimal places.

135) $\log_8(5) + \log_8(x) = 1$

136) $\log(3) + \log(x) = 0$

137) $\log_3(x - 4) + \log_3(x - 10) = 3$

138) $\log_{21}(x + 84) + \log_{21}(x) = 3$

139) $\log_2(3x - 2) - \log_2(x - 5) = 4$

140) $\log_6(x + 6) + \log_6(x) = 3$

Solve the equation. Round the solution to four decimal places, if necessary.

141) $e^{5x} = 3$

142) $e^{(x + 8)} = 6$

143) $\ln(6x) + \ln(3x) = 5$

144) $2\ln(2x^2) + 3\ln(7x^3) = 5$

145) $e^{2x - 5} \cdot e^{4x} = 127$

146) $e^{(x + 5)} = 7$

Simplify. Write the expression as a single logarithm with a coefficient of 1.

147) $2\ln(x^2) + 2\ln(5x)$

148) $2 \ln (x^2) + 4 \ln (5x)$

149) $6 \ln(a) - 8 \ln(b)$

150) $9 \ln(a) - 7 \ln(b)$

151) $11 \ln(x - 6) - 7 \ln(x)$

152) $3 \ln(x - 8) - 11 \ln(x)$

153) $3 \ln (x^2) + 4 \ln (6x)$

154) $3 \ln (w^2) - \ln (8w^8)$

155) $3 \ln(x - 11) - 7 \ln(x)$

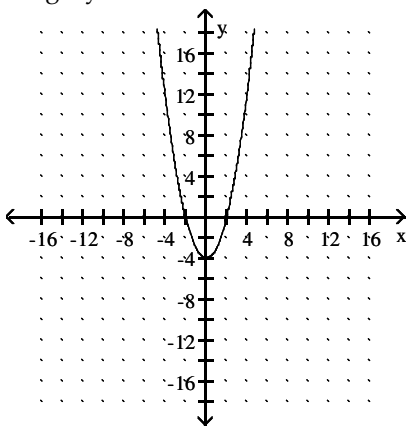
156) $3 \ln (x^2) + 2 \ln (6x)$

157) $3 \ln (w^2) - \ln (8w^9)$

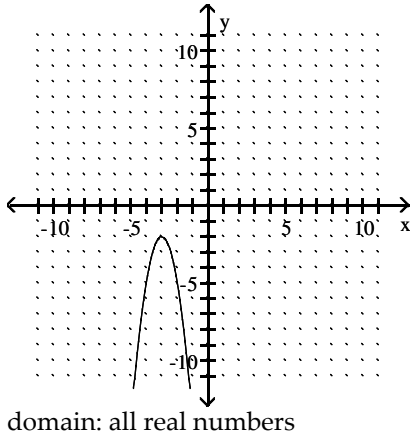
158) $3 \ln (x^2) + 4 \ln (3x)$

159) $2 \ln (w^2) - \ln (6w^8)$

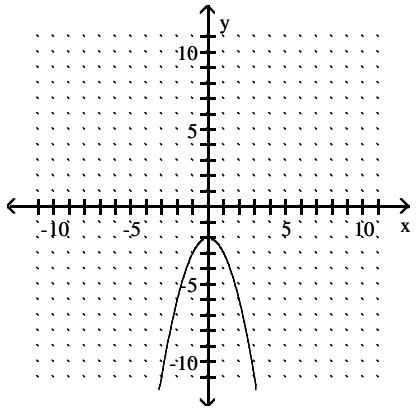
1) domain: all real numbers
range: $y \geq -4$



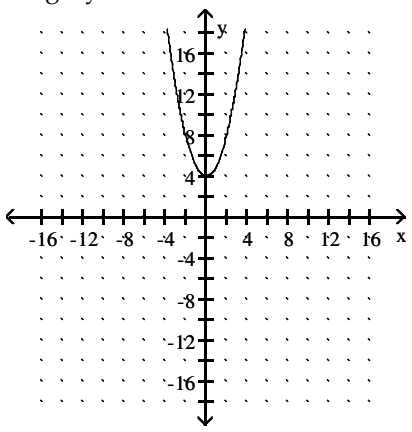
2) domain: all real numbers
range: $y \leq -2$



3) domain: all real numbers
range: $y \leq -2$



4) domain: all real numbers
range: $y \geq 4$



5) (22, 5)
6) 5
7) −9.4
8) 3
9) $-11 \pm \sqrt{2}$
10) $\frac{-3 \pm \sqrt{5}}{2}$
11) $\frac{-2 \pm \sqrt{10}}{5}$
12) 4, −10
13) $\frac{5 \pm 8\sqrt{5}}{5}$
14) $\frac{1}{2}, \frac{1}{6}$
15) $\frac{5 \pm 9\sqrt{5}}{5}$
16) 15i
17) −5i
18) $2i\sqrt{70}$
19) $\frac{i\sqrt{13}}{2}$
20) $\frac{i\sqrt{55}}{11}$
21) $-10i\sqrt{2}$
22) ±3i
23) $\pm 2i\sqrt{6}$
24) $\pm i\sqrt{13}$
25) 4 − 11i, 4 + 11i
26) $\frac{-4 \pm i\sqrt{5}}{3}$

27) $\frac{2 \pm 7i\sqrt{2}}{2}$

28) $x = 2 \pm 3i$

29) $4 \pm 2i\sqrt{2}$

30) $\frac{-1 \pm i\sqrt{3}}{2}$

31) $\frac{5 \pm i\sqrt{35}}{10}$

32) $\frac{-5 \pm i\sqrt{167}}{12}$

33) $\frac{5 \pm i\sqrt{7}}{4}$

34) (7, 0), (–1, 0)

35) $(-9 - \sqrt{11}, 0)$, $(-9 + \sqrt{11}, 0)$

36) $(-6 - 2\sqrt{6}, 0)$, $(-6 + 2\sqrt{6}, 0)$

37) $\left(\frac{-7 - \sqrt{37}}{2}, 0\right)$, $\left(\frac{-7 + \sqrt{37}}{2}, 0\right)$

38) $\left(\frac{-7 - \sqrt{21}}{2}, 0\right)$, $\left(\frac{-7 + \sqrt{21}}{2}, 0\right)$

39) $\left(\frac{-7 - \sqrt{29}}{2}, 0\right)$, $\left(\frac{-7 + \sqrt{29}}{2}, 0\right)$

40) $4 \pm \sqrt{19}$

41) $-\frac{2}{3}, 0$

42) $\pm \frac{\sqrt{91}}{7}$

43) $\frac{-6 \pm \sqrt{26}}{2}$

44) $\frac{1 \pm \sqrt{10}}{3}$

45) $\frac{-1 \pm \sqrt{33}}{8}$

46) $6 \pm 8i\sqrt{5}$

47) $\frac{-1 \pm i\sqrt{19}}{2}$

48) $\frac{7 \pm i\sqrt{15}}{32}$

49) $\frac{9 \pm i\sqrt{111}}{12}$

50) $\frac{2 \pm i\sqrt{66}}{10}$

51) $\frac{5 \pm i\sqrt{39}}{32}$

52) $\pm\frac{2}{3}$

53) $\pm\sqrt{7}$

54) $-\frac{1}{2}, 6$

55) $-2 \pm \sqrt{22}$

56) $\frac{-4 \pm \sqrt{11}}{5}$

57) $-4, -\frac{1}{2}$

58) 8

59) $-\frac{1}{5}, 2$

60) $\frac{1}{2}, 4$

61) $2 \pm 7i\sqrt{2}$

62) $\frac{7 \pm 6i\sqrt{7}}{7}$

63) $\frac{3 \pm i\sqrt{103}}{8}$

64) $3 \pm 5i\sqrt{7}$

65) $2 \pm 7i\sqrt{5}$

66) $\frac{2 \pm 7i\sqrt{2}}{2}$

67) $-8 \pm 2i\sqrt{2}$

68) $\frac{5 \pm 6i\sqrt{5}}{5}$

69) $\frac{5 \pm 8i\sqrt{5}}{5}$

70) 2 real solutions
71) 1 real solution
72) 2 imaginary solutions
73) 2 imaginary solutions
74) 2 real solutions
75) 2 real solutions
76) 2 imaginary solutions
77) 1 real solution
78) 2 real solutions
79) 2 real solutions
80) 2 imaginary solutions
81) 2 imaginary solutions
82) 1988
83) 3.5 sec
84) length: 52 ft, width: 26 ft
85) $5681
86) 22 cakes

87) 1995; $172 million
88) (13.28, 64.47); 64.47% of cases were solved in 1993, which is the lowest percent for any year.
89) $\log_5(x)$
90) 5^x
91) $\log_3(x)$
92) 4.5 sec
93) length: 32 ft, width: 16 ft
94) $2083
95) $\sqrt{x}$
96) $\sqrt[3]{x^7}$
97) $\left(\sqrt[4]{3x^4y^8}\right)^5$
98) $(2x^8y^{13})^{1/5}$
99) $2x^3y^4\sqrt{2x}$
100) $\sqrt[3]{x^4yz^3}$
101) $(x + 2)^4$
102) $4x\sqrt{7x}$
103) $2x\sqrt[3]{4} - 2x^2\sqrt[3]{14x}$
104) $3 - z$
105) $12 - 7\sqrt{x} + x$
106) $8x^2 - 7x\sqrt[5]{y^4} - y\sqrt[5]{y^3}$
107) $5x\sqrt{5} - 10\sqrt{x} + 2\sqrt{5x} - 4$
108) $9x - 46\sqrt{x} - 48$
109) $2\sqrt[4]{5}$
110) $5x^2y^4$
111) $\sqrt[10]{xy}$
112) 16
113) – 72
114) empty set
115) 5
116) $\frac{11}{2}$
117) 10
118) $\frac{2}{11}$
119) –2, 3
120) 4
121) 12, 8
122) (7, 0)
123) (10, 0)
124) no x–intercepts

125) $V = \frac{\pi r^2 h}{3}$

126) $\theta = \frac{2A}{r^2}$

127) $r = \sqrt{x^2 + y^2}$

128) $p = \frac{q}{\sqrt{1 - q^2}}$

129) $F = \frac{GH}{\sqrt{1 - H^2}}$

130) 9

131) 3

132) 2

133) 27

134) 25

135) $\frac{8}{5}$

136) $\frac{1}{3}$

137) 13

138) 63

139) 6

140) 12

141) 0.2197

142) −6.2082

143) 2.8714

144) 0.8428

145) 1.6407

146) −3.0541

147) $\ln(25x^6)$

148) $\ln(625x^8)$

149) $\ln\left(\frac{a^6}{b^8}\right)$

150) $\ln\left(\frac{a^9}{b^7}\right)$

151) $\ln\left(\frac{(x - 6)^{11}}{x^7}\right)$

152) $\ln\left(\frac{(x - 8)^3}{x^{11}}\right)$

153) $\ln(1296x^{10})$

154) $\ln\left(\frac{1}{8w^2}\right)$

155) $\ln\left(\frac{(x - 11)^3}{x^7}\right)$

156) $\ln (36x^8)$

157) $\ln \left(\frac{1}{8w^3} \right)$

158) $\ln (81x^{10})$

159) $\ln \left(\frac{1}{6w^4} \right)$