

MATH 136 – Final Exam Review

Updated December 2021-January 2022

This review is a collection of sample questions used by instructors of this course at Missouri State University. It contains a sampling of problems representing the material covered throughout the semester and may not contain every type of question on the final exam. Any material listed on the lecture schedule and/or the assignment sheet may be on the final exam. Please also be aware that a few questions on the final exam, while requiring knowledge and understanding of the content covered in the course, may be presented in a form different than the problems in the text.

P.3 Review Questions

Evaluate each expression.

1) -2^6

2) $\frac{\sqrt{48}}{\sqrt{3}}$

Simplify each and eliminate negative exponents.

3) $\frac{x^5 x^0}{x^7}$

4) $(2x^{-2}y^3)^4$

Simplify. Assume all variables represent positive numbers.

5) $\sqrt[3]{16x^9y^{10}}$

6) $\sqrt[4]{\frac{32x^8}{81y^4}}$

7) $\frac{x^{4/3} \cdot x^{2/3}}{x^{1/3}}$

8) $\frac{(8x^3y^3)^{2/3}}{(x^4y^{-8})^{1/4}}$

Evaluate each expression.

9) $9^{-1/2}$

10) $5^{9/4} \cdot 5^{-1/4}$

Rationalize each denominator.

11) $\frac{7}{\sqrt{5}}$

12) $\frac{4}{3-\sqrt{2}}$

P.5 Review Questions

Factor the expression completely. Begin by factoring out the lowest power of each common factor.

13) $x^{5/2} - x^{1/2}$

14) $3x^{-1/2} + 4x^{1/2} + x^{3/2}$

15) $x^{-3/2} + 2x^{-1/2} + x^{1/2}$

16) $(x - 1)^{7/2} - (x - 1)^{3/2}$

17) $(x^2 + 1)^{1/2} + 2(x^2 + 1)^{-1/2}$

18) $x^{-1/2}(x + 1)^{1/2} + x^{1/2}(x + 1)^{-1/2}$

P.7 Review Questions

Find all real solutions to the following equations.

19) $x^2 + 5x - 6 = 0$

20) $3x^2 + 7x + 4 = 0$

21) $x^2 - 6x + 1 = 0$

22) $x^2 = 3(x - 1)$

23) $\frac{x + 5}{x - 2} = \frac{5}{x + 2} + \frac{28}{x^2 - 4}$

24) $\frac{x}{2x + 7} - \frac{x + 1}{x + 3} = 1$

25) $\sqrt{8x - 1} = 3$

26) $\sqrt{5 - x} + 1 = x - 2$

27) $2x + \sqrt{x + 1} = 8$

28) $x - 5\sqrt{x} + 6 = 0$

P.9 Review Questions

Solve each inequality, graph its solution on a number line, then leave the solution in interval notation.

29) $|3x-5|+9 > 2$

30) $|3x-2|+1 \leq 4$

31) $x^2 + 3x \leq 0$

32) $|x + 3| \geq 4$

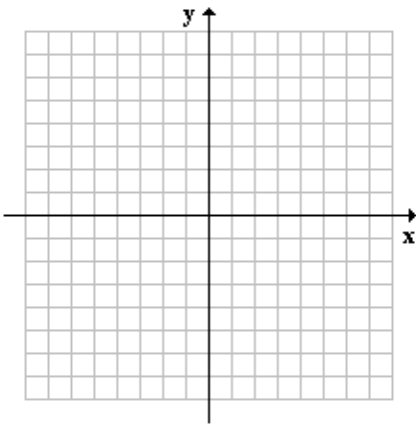
33) $-3|x + 7| + 1 \geq -26$

34) $\left| 2 - \frac{x}{2} \right| - 1 \leq 1$

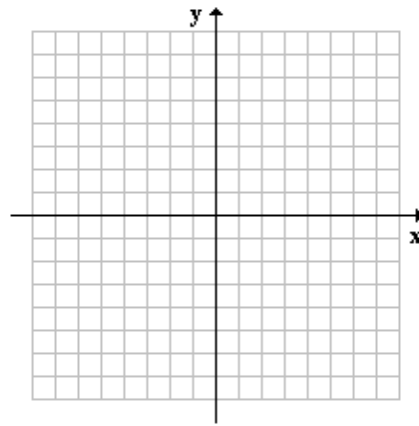
1.1 Review Questions

Graph each of the following functions. Let $x = -3, -2, -1, 0, 1, 2$ and 3

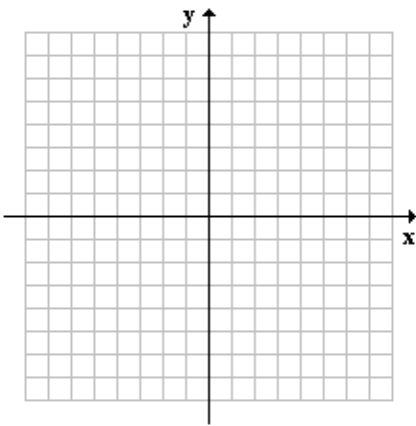
35) $5y = 10 - 3x$



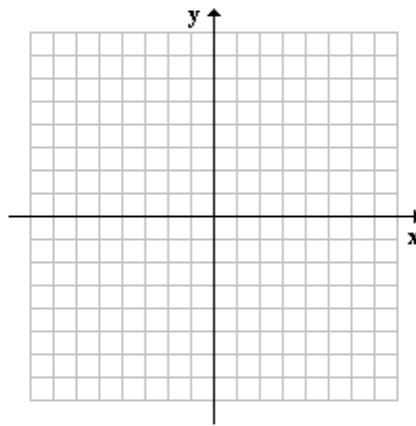
36) $y = \frac{2x+9}{3}$



37) $y = -2x^2 + 5$



38) $y = 2|x| - 3$



1.2 & 1.3 Review Questions

Give the domain of each function.

39) $f(x) = \sqrt{3x+2}$

40) $h(x) = \frac{x-1}{x-5}$

41) $f(x) = \sqrt{3-x}$

42) $f(x) = \log(x-8)$

43) $f(x) = 4x^2 + 5$

44) $f(x) = \frac{5x}{x^2 - 1}$

45) $g(x) = \frac{3x+1}{x^2 + 4}$

46) $g(x) = 5x - 1$

Find each of the following given

$f(x) = x^2 + 1$;

$g(x) = 3x - 5$;

$$h(x) = \begin{cases} 3x & \text{if } x < 0 \\ x-2 & \text{if } 0 \leq x \leq 10 \\ 5 & \text{if } x > 10 \end{cases}$$

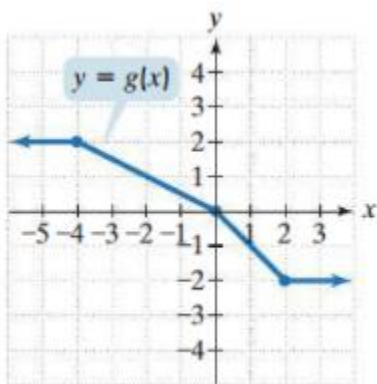
47) $h(12)$

48) $h(0)$

49) $g(t+1)$

50) $f(3x)$

Use the graph to find 51 to 55.



51) Find $g(2)$.

52) Find $g(-2)$.

53) For what value of x is $g(x) = -1$?

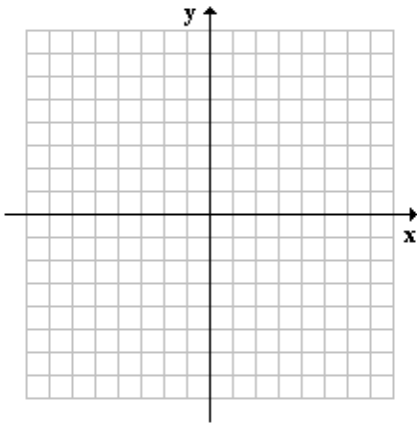
54) For what values of x is $g(x)$ decreasing?

55) For what values of x is $g(x)$ constant?

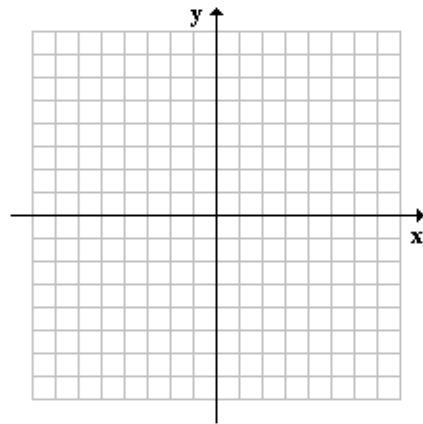
1.2 & 1.3 Review Questions continued

The domain of each piecewise function is $(-\infty, \infty)$. Graph the functions and determine the range of each.

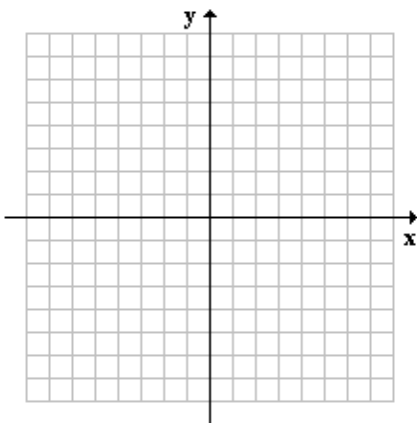
56)
$$f(x) = \begin{cases} 2x & \text{if } x \leq 0 \\ 2 & \text{if } x > 0 \end{cases}$$



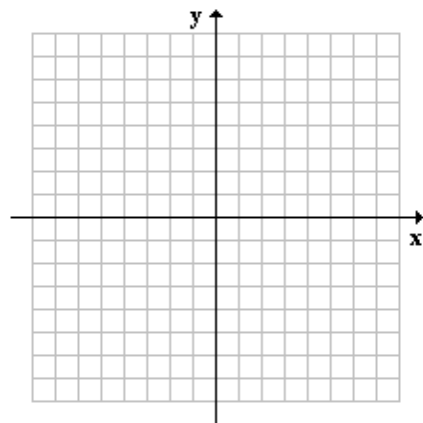
57)
$$f(x) = \begin{cases} \frac{1}{2}x^2 & \text{if } x < 1 \\ 2x - 1 & \text{if } x \geq 1 \end{cases}$$



58a)
$$f(x) = \begin{cases} 0 & \text{if } x < -4 \\ -x & \text{if } -4 \leq x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$



58b)
$$f(x) = \begin{cases} \frac{2}{3}x & \text{if } x \leq 2 \\ 4 & \text{if } x > 2 \end{cases}$$



1.4 & 1.5 Review Questions

Find the linear equation to represent each of the following conditions.

59) Write the equation of the line through (2, 4) with slope of $-\frac{4}{7}$.

60) Write the equation of the line through the points (3,-7) and (8,-4).

61) Write the equation of the line through (0,1) and perpendicular to $2x - 3y = 5$.

62) Write the equation of a line through (3,1) and parallel to $2x - 3y = 5$.

Find the linear equation to represent each of the following conditions.

63) Write the equation of a line parallel to $y + 5 = 2$ and passing through the point (-4,6).

64) Write the equation of a line perpendicular to $y = 8$ and through (-1,-5).

65) Write the equation of a line parallel to $y = 8$ and through (-1,-5).

1.4 & 1.5 Review Questions Continued

Find the average rate of change of the functions from x_1 to x_2

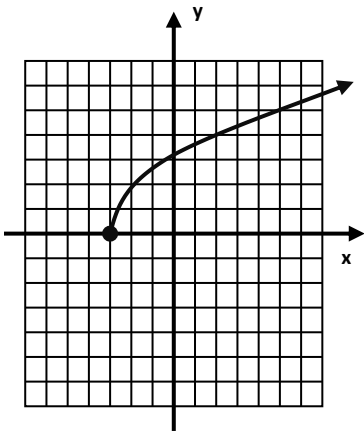
66) $f(x) = 4x + 2$ from $x_1 = 3$ to $x_2 = 6$

67) $f(x) = x^2 + 3x$ from $x_1 = 1$ to $x_2 = 3$

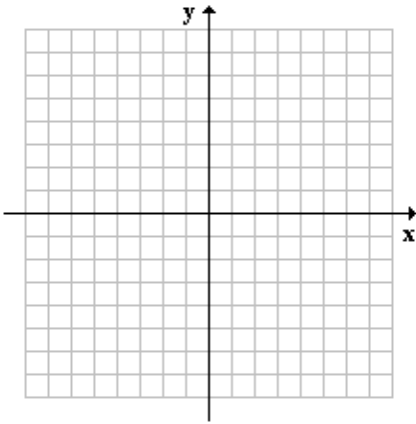
68) $f(x) = \sqrt{x + 2}$ from $x_1 = 2$ to $x_2 = 7$

1.6 Review Questions

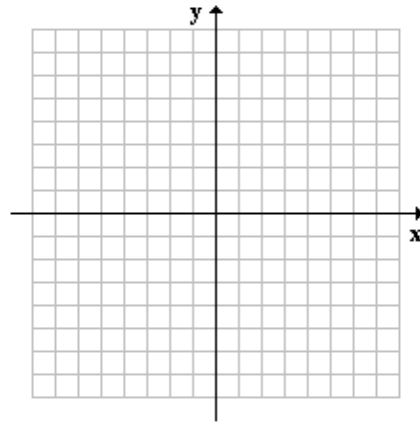
Describe the transformation and sketch each of the following, given the graph of $f(x)$ to the right.



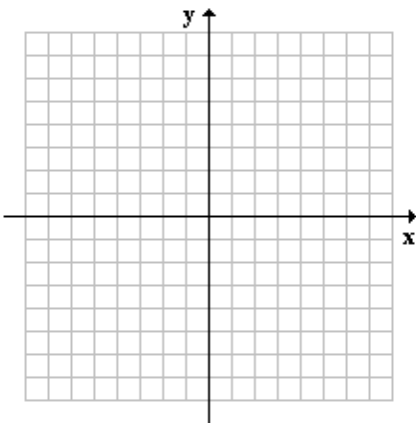
69) $y = 2f(x) - 3$



70) $y = -f(x + 5)$



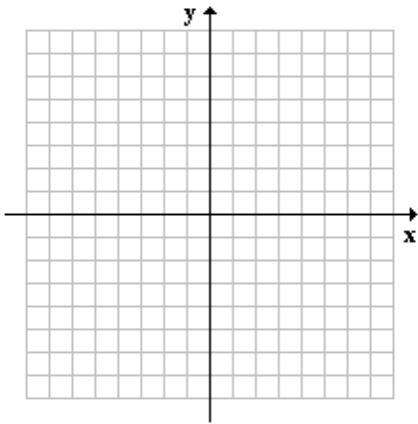
71) $g(x) = f(x - 2) + 1$



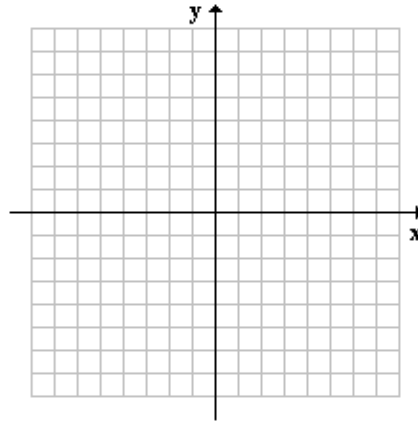
1.6 Review Questions continued

Graph the standard function and the function $g(x)$ on the same coordinate system.

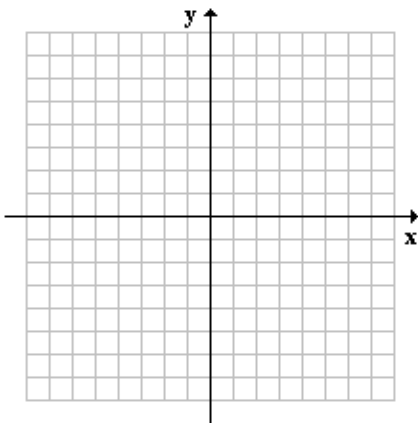
72) $g(x) = 2|x - 1| - 4$



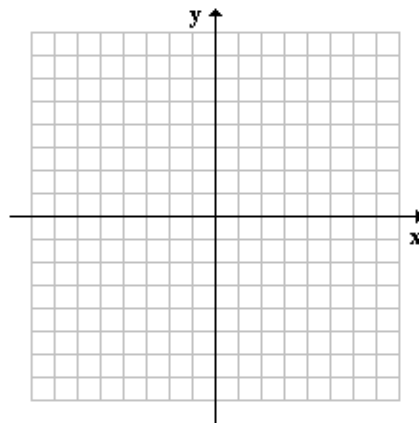
73) $g(x) = -\sqrt{x + 3} + 5$



74) $g(x) = -\frac{1}{2}(x + 5)^2 + 4$



75) $g(x) = (x - 5)^3 + 4$



1.7 Review Questions

Find each of the following given $f(x) = x^2 + 1$; $g(x) = 3x - 5$;

$$h(x) = \begin{cases} 3x & \text{if } x < 0 \\ x - 2 & \text{if } 0 \leq x \leq 10 \\ 5 & \text{if } x > 10 \end{cases}$$

76) $(f + h)(-1)$

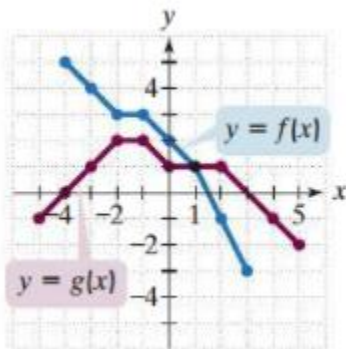
77) $(f + g)(x)$

78) $(f - g)(x)$

79) $(g \circ f)(2)$

80) $(f \circ g)(x)$

Use the graphs to find the following:



81) $(f + g)(2)$

82) $(g - f)(-2)$

83) $(f \circ g)(2)$

84) $(g \circ f)(2)$

85) $(g \circ g)(5)$

1.8 Review Questions

Find the inverse for each one-to-one function.

86) $f(x) = 2x - 8$

87) $f(x) = \frac{2x+1}{3}$

88) $f(x) = \frac{3x-2}{2x+1}$

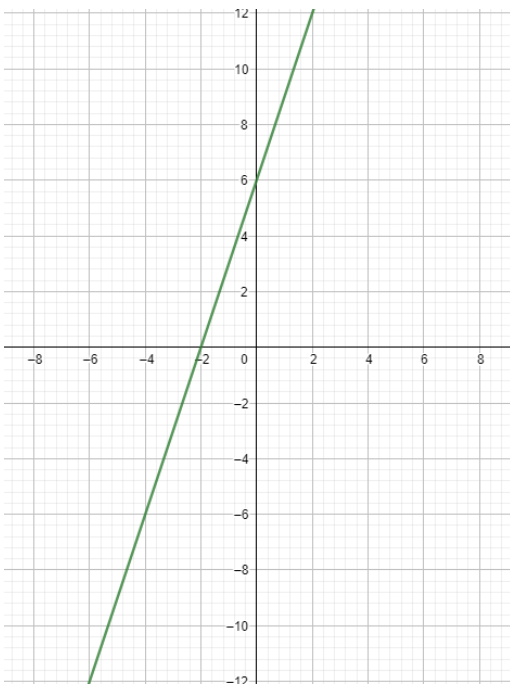
89) $f(x) = \sqrt[5]{x-3}$

90) Given that $f(x) = 2x - 8$, evaluate $f^{-1}(6)$

91) Given that $g(x) = \frac{5x-1}{2x+3}$, evaluate $g^{-1}(2)$

Graph the inverse function of the given one to one function below.

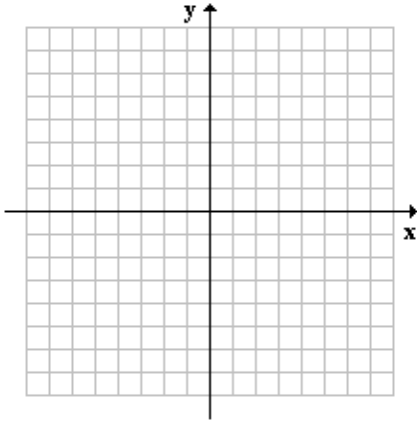
92)



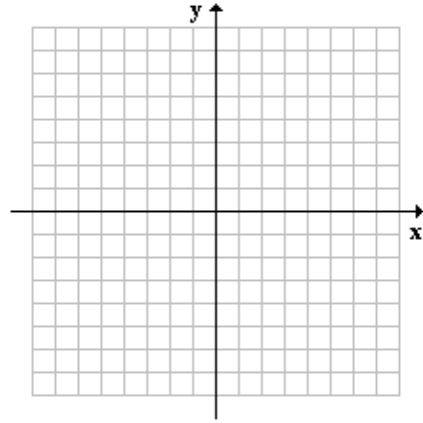
2.2 Review Questions

Graph each of the following functions. Label reference points.

93) $y = 3x^2 + 6x + 6$



94) $y = \frac{-1}{2}(x+2)^2 + 8$



95) Suppose that the manufacturer of a gas clothes dryer has found that, when the unit price is p dollars, the revenue R (in dollars) is $R(p) = -4p^2 + 4000p$.

A) What unit price should be established for the dryer to maximize revenue?

B) What is the maximum revenue?

2.2 Review Questions Continued

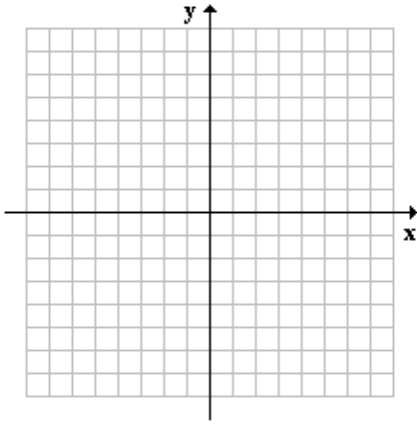
96) A soft-drink vendor at a popular beach analyzes his sales records and finds that if he sells x cans of soda pop in one day his profit (in dollars) is modeled by the given equation: $P(x) = -0.001x^2 + 3x - 1800$. What is his maximum profit per day, and how many cans must he sell for maximum profit?

97) The net income, y , (given in millions of dollars) of Pet Products Unlimited from 2004 to 2006 is given by the equation $y = 9x^2 + 15x + 52$, where x represents the number of years after 2004. Assume this trend continues and predict the year in which Pet Products Unlimited's net income will be \$598 million.

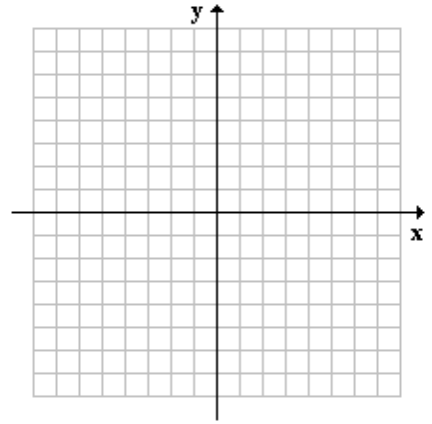
2.3 Review Questions

Graph each of the following functions. Label reference points.

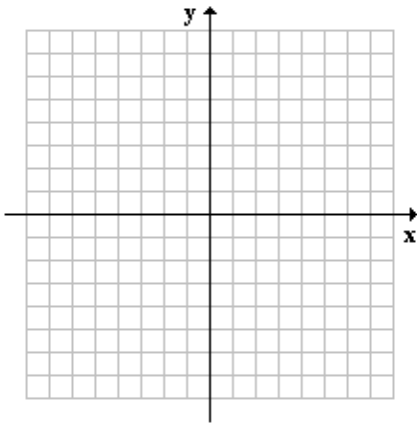
98) $f(x) = 2 - x^3$



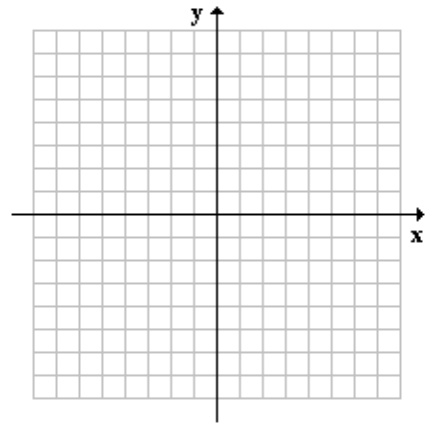
99) $f(x) = (x-2)^3(x+3)^2(x-4)$



100) $f(x) = -3(x-1)^2(x+2)(x-2)$



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



Use the Leading Coefficient Test to determine the end behavior of the graph of the polynomial function.

102) $f(x) = 4x^3 - 2x^2 + 8x - 1$

103) $f(x) = -6x^4 - 5x^3 + 2x + 1$

2.4 Review Questions

Use synthetic division to divide the following:

104) $2x^3 - 7x^2 + 5$ by $x - 3$

105) $6x^2 - 26x + 12$ by $x - 4$

Use the Remainder Theorem to find the value of the polynomial:

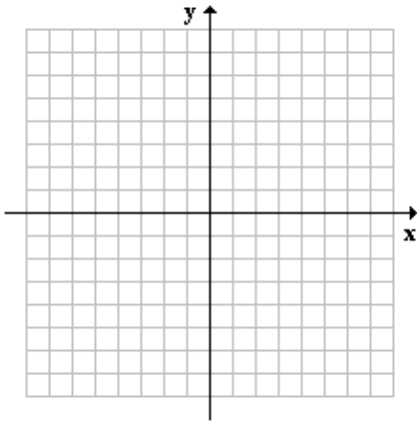
106) $P(x) = 3x^5 + 5x^4 - 4x^3 + 7x + 3$ $P(-2)$

107) $P(x) = x^3 - 7x + 6$ $P(1)$ and $P(-3)$

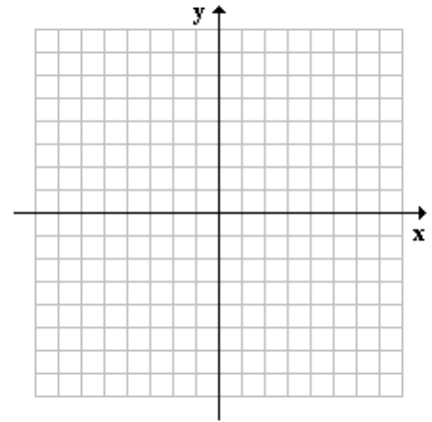
2.6 Review Questions

Graph each of the following functions. Label reference points and all asymptotes.

108) $f(x) = \frac{5x}{(x-1)(x+4)}$



109) $f(x) = \frac{(x+3)(x+1)}{x^2 + 8x + 16}$



Find the horizontal asymptote, if there is one, of the graph of each rational function.

110) $f(x) = \frac{5x}{(x-1)(x+4)}$

111) $f(x) = \frac{(x+3)(x+1)}{x^2 + 8x + 16}$

Find the slant asymptote (oblique asymptote) of the graph each rational function.

112) $f(x) = \frac{x^2 - 4x - 5}{x - 3}$

113) $f(x) = \frac{x^3 - 2x^2 + 3}{x - 2}$

Find the holes (removable discontinuities) of the following rational functions.

114) $f(x) = \frac{x - 3}{x^2 - 3x}$

115) $f(x) = \frac{x^3 - 2x^2}{x - 2}$

2.7 Review Questions

Solve each inequality, graph its solution on a number line, then leave the solution in interval notation.

116) $x^2 - 7x > -10$

117) $x^2 - 5x + 4 \leq 0$

118) $\frac{3x}{x-2} \geq 4$

119) $\frac{3x-1}{x+3} < 2$

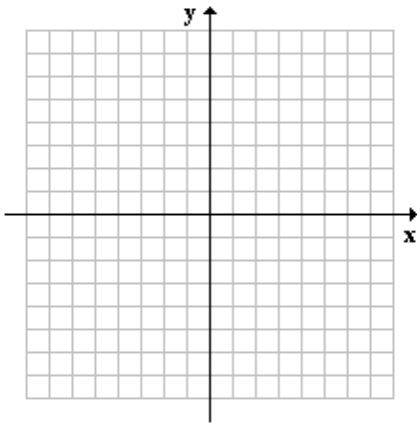
120) $\frac{3x+1}{x-7} > 0$

121) $\frac{5x+10}{x+4} < 0$

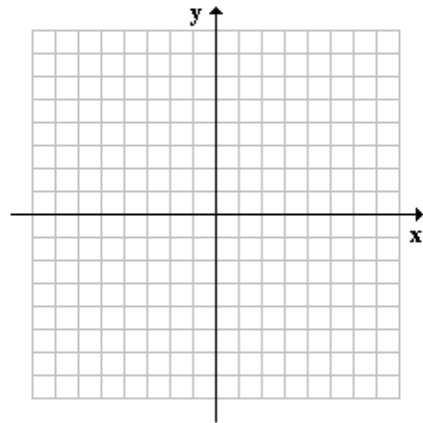
3.1 Review Questions

Graph each of the following functions. Label reference points and all asymptotes.

122) $f(x) = e^{-x} - 1$

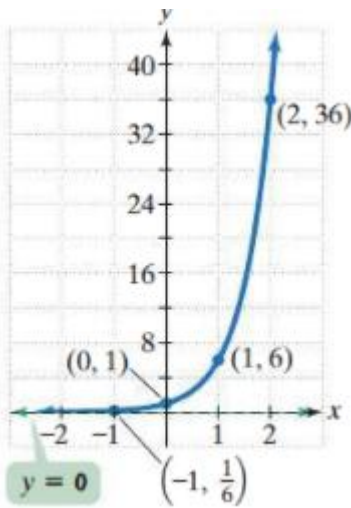


123) $f(x) = 2^{x+1}$

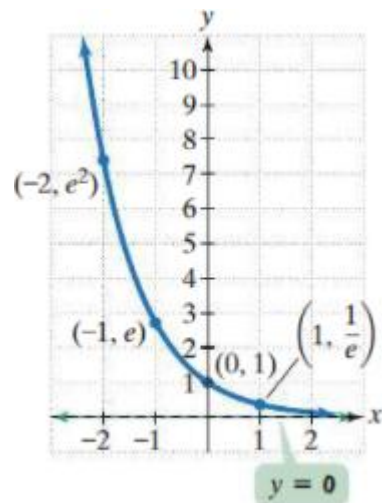


Give the equation of each exponential function whose graph is given.

124)



125)

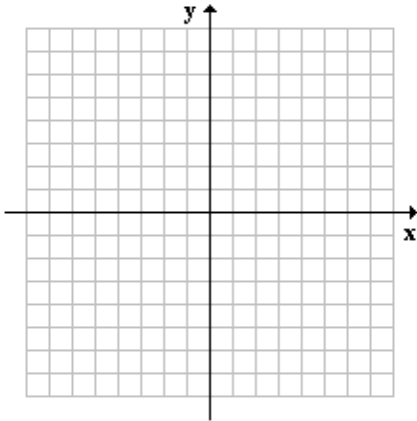


126) If \$8000 is invested in an account for which interest is compounded continuously, find the amount of the investment at the end of 12 years for a 4.5% interest rate.

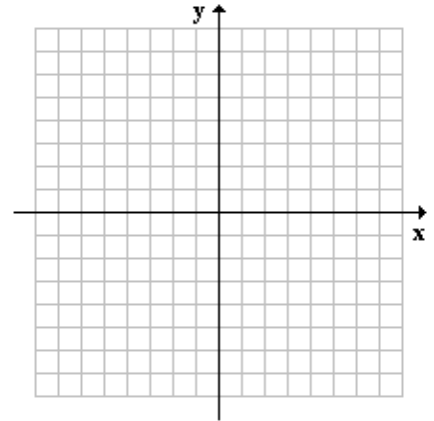
3.2 Review Questions

Graph each of the following functions. Label reference points and all asymptotes.

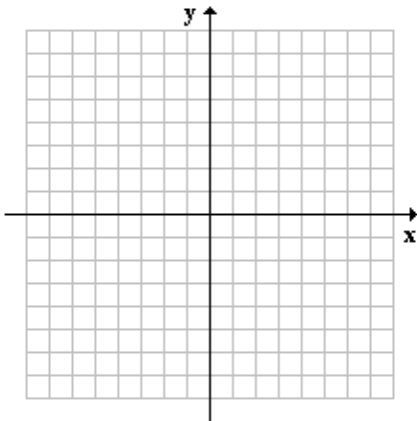
127) $f(x) = \log_3(x - 2)$



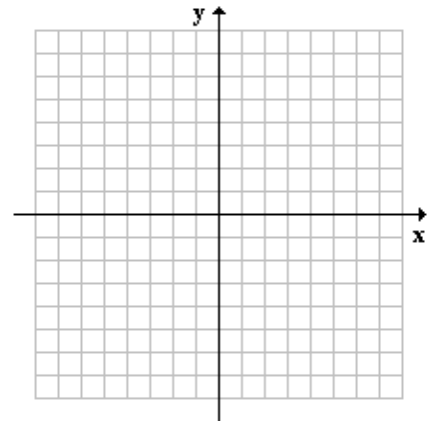
128) $f(x) = \log_2(x) + 3$



129) $y = 2 - \ln(x + 4)$



130) $y = \ln(-x)$



Write each equation in its equivalent exponential form. Then solve for x.

131) $\log_3(x - 2) = 4$

132) $\log_5 x = -2$

Find the domain of each logarithmic function.

133) $f(x) = \log_3(x - 2)$

134) $y = \ln(-x)$

3.3 Review Questions

Evaluate or simplify to lowest terms possible. Do not use a calculator.

135) $\log_5 125$

136) $\log_9 \frac{1}{81}$

137) $\log_8 32$

138) $\log(.01)$

139) $\ln e^{2x}$

140) $\log_7 \sqrt[3]{7}$

141) $\log_3 36 - \log_3 4$

142) $\log_6 4 + \log_6 9$

Evaluate. Use the Change of Base Theorem. Round to four decimal places.

143) $\log_5 93$

144) $\log_9 658$

145) $\log_\pi 55$

146) $\log_{0.8} 15$

3.4 Review Questions

Solve each equation. Leave all answers exact. DO NOT ROUND.

147) $2^{2x+1} = 8$

148) $2^{(5-3x)} = \frac{1}{16}$

149) $\log_x 64 = 3$

150) $\log_x \left(\frac{8}{27} \right) = 3$

Solve each equation. Leave all answers exact. DO NOT ROUND.

151) $\log(5x) = \log 4 + \log(x-3)$

152) $\log_9 x^2 = \log_9 (7x+8)$

153) $\log_3(x+1) - \log_3 4 = 2$

154) $\left(\frac{1}{4} \right)^x = 17$

155) $7^x = 6^{x+7}$

156) $\log x + \log 6 = 2$

157) $5e^{3x-1} = 25$

158) $\log x + \log(x-3) = 1$

159) $\log_2 8 - \log_5 x = \log_5 4$

3.5 Review Questions

For problems 160-166, solve each problem. Remember to identify variables and give the equation used to solve each problem.

160) Since 1950, the growth in the world population in millions closely fits the exponential function $A(t) = 2600e^{0.018t}$, where t is the number of years since 1950. Estimate the population in the year 2018 to the nearest million.

161) The formula $D = 6e^{-0.04h}$ can be used to find the number of milligrams D of a certain drug in a patient's bloodstream h hours after the drug has been given. When the number of milligrams reaches 2, the drug is given again. What is the time (in hours) between injections?

162) If Emery has \$1800 to invest at 6% per year compounded monthly, how long will it be before he has \$2700? If the compounding is continuous, how long will it be? (round your answers to 3 decimal places)

163) Cindy will require \$20,000 in 4 years to return to college to get an MBA degree. How much money should she ask her parents for now so that, if she invests it at 9% compounded continuously, she will have enough for school?

3.5 Review Questions Continued

164) How long does it take \$1700 to double if it is invested at 5% interest, compounded quarterly?

165) The half-life of silicon-32 is 710 years. If 100 grams is present now, how much will be present in 600 years? (Use the exponential growth/decay formula, round answer to 3 decimal places.)

166) The logistic growth function $f(t) = \frac{160}{1 + 9e^{-0.135t}}$ describes the population, $f(t)$, of an endangered species of moose t years after they were introduced to a nonthreatening habitat.

a) How many moose were initially introduced to the habitat?

b) How many moose are expected in the habitat after 15 years?

c) What is the limiting size of the moose population that the habitat will sustain?

d) After how many years can the habitat expect 100 moose?

7.1 Review Questions

Solve each system of equations. Write as an ordered pair.

$$167) \begin{cases} x + y = 9 \\ 2x - 3y = -2 \end{cases}$$

$$168) \begin{cases} 2x - 3y = 5 \\ 5x + 4y = 1 \end{cases}$$

$$169) \begin{cases} 3x - 12y = 6 \\ 2x - 8y = 4 \end{cases}$$

$$170) \begin{cases} 2x + 6y = 7 \\ 3x + 9y = 10 \end{cases}$$

7.1 Review Questions Continued

Solve each problem. Remember to identify variables and give the equation used to solve each problem

171) The difference between two numbers is 3. Twice the first number increased by the second number is 18. Find the numbers.

172) The sum of twice the first number and three times the second number is 10 and the difference of the first number and twice the second number is -2. Find the numbers.

173) A riverboat travels 46 km downstream in 2 hours. It travels 51 km upstream in 3 hours. Find the speed of the boat in still water and find the speed of the stream.

7.1 Review Questions Continued

Solve each problem. Remember to identify variables and give the equation used to solve each problem

174) One pan pizza and two beef burritos provide 1980 calories. Two pan pizzas and one burrito provide 2670 calories. Find the caloric content of each item.

175) A 1000-acre farm in Illinois is used to grow corn and soybeans. The cost per acre for raising corn is \$65, and the cost per acre for raising soybeans is \$45. If \$54,325 has been budgeted for costs and all the acreage is to be used, how many acres should be allocated for soybeans?

176) Bronze which costs \$9.10/kg is made by combining copper which costs \$8.90/kg with tin which costs \$9.50/kg. Find the number of kg of copper and tin required to make 15.3 kg of bronze.

7.2 Review Questions

Solve each system of equations. Write as an ordered triple.

$$177) \begin{cases} x - y + z = 0 \\ y + 2z = -2 \\ x + y - z = 2 \end{cases}$$

$$178) \begin{cases} x - 2y + 3z = -10 \\ 3y + z = 7 \\ x + y - z = 7 \end{cases}$$

$$179) \begin{cases} x + y + z = 0 \\ -x + 2y + 5z = 3 \\ 3x - y = 6 \end{cases}$$

$$180) \begin{cases} x + 2y - z = 1 \\ 2x + 3y - 4z = -3 \\ 3x + 6y - 3z = 4 \end{cases}$$

7.2 Review Questions Continued

181) Mark has \$100,000 to invest. His financial consultant advises him to diversify his investment in three types of bonds: short-term, intermediate-term, and long-term. The short-term bonds pay 4%, the intermediate bonds pay 5%, and the long-term bonds pay 6% simple interest per year. Mark wishes to realize a total annual income of 5.1%, with equal amounts invested in short- and intermediate-term bonds. How much should he invest in each type of bond?

182) A farmer has 1200 acres of land on which he grows corn, wheat, and soybeans. It costs \$45 per acre to grow corn, \$60 to grow wheat, and \$50 to grow soybeans. Because of market demand, the farmer will grow twice as many acres of wheat as of corn. He has allocated \$63,750 for the cost of growing his crops. How many acres of each crop should he plant?

183) A gas station sells three types of gas: regular for \$3.00 a gallon, Performance Plus for \$3.20 a gallon, and Premium for \$3.30 a gallon. On a particular day 6500 gallons of gas were sold for a total of \$20,050. Three times as many gallons of Regular as Premium gas was sold. How many gallons of each type of gas were sold that day?

Solutions

P.3 Solutions:

1) -64

2) 4

3) $\frac{1}{x^2}$

4) $\frac{16y^2}{x^8}$

5) $2x^3y^3\sqrt{2y}$

6) $\frac{2x^2\sqrt[4]{2}}{3y}$

7) $x^{5/3}$

8) $4xy^4$

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

10) 25

11) $\frac{7\sqrt{5}}{5}$

12) $\frac{12 + 4\sqrt{2}}{5}$

P.5 Solutions:

13) $\sqrt{x}(x-1)(x+1)$

14) $\frac{(x+3)(x+1)}{\sqrt{x}}$

15) $x^{-3/2}(1+x)^2$

16) $x(x-2)(x-1)^{3/2}$

17) $(x^2+1)^{-1/2}(x^2+3)$

18) $x^{-1/2}(x+1)^{-1/2}(2x+1)$

P.7 Solutions:

19) -6, 1

20) $\frac{-4}{3}, -1$

21) $3 \pm 2\sqrt{2}$

22) No Solution

23) -4

24) $-4, \frac{-7}{3}$

25) $\frac{5}{4}$

26) 4

27) 3

28) 4, 9

P.9 Solutions:

29) $(-\infty, \infty)$

30) $\left[-\frac{1}{3}, \frac{5}{3}\right]$

31) $[-3, 0]$

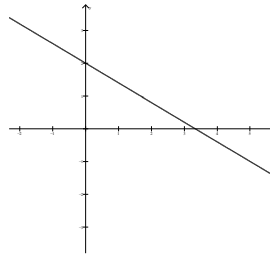
32) $(-\infty, -7] \cup [1, \infty)$

33) $[-16, 2]$

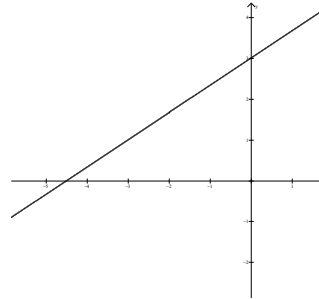
34) $[0, 8]$

1.1 Solutions:

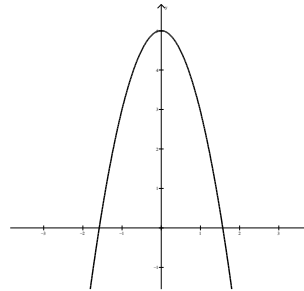
35)



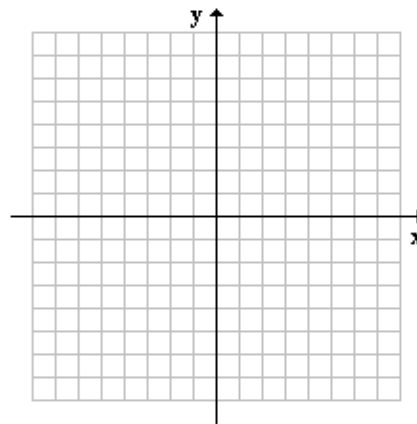
36)



37)



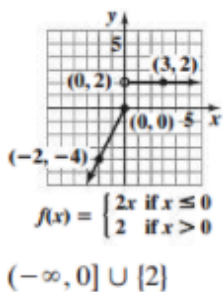
38)



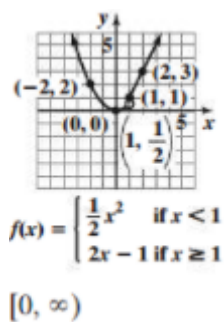
1.2 & 1.3 Solutions:

- 39) $\left[-\frac{2}{3}, \infty\right)$
 40) All real numbers except 5
 41) $(-\infty, 3]$
 42) $(8, \infty)$
 43) $(-\infty, \infty)$
 44) All reals except ± 1
 45) $(-\infty, \infty)$
 46) $(-\infty, \infty)$
 47) 5
 48) -2
 49) $3t - 2$
 50) $9x^2 + 1$
 51) -2
 52) 1
 53) 1
 54) $(-4, 2)$
 55) $(-\infty, -4) \cup (2, \infty)$

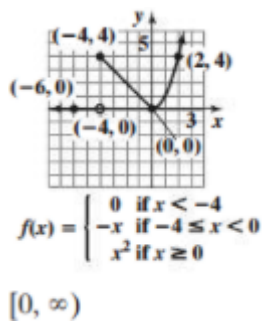
56)



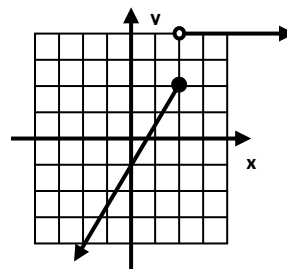
57)



58a)



58b)

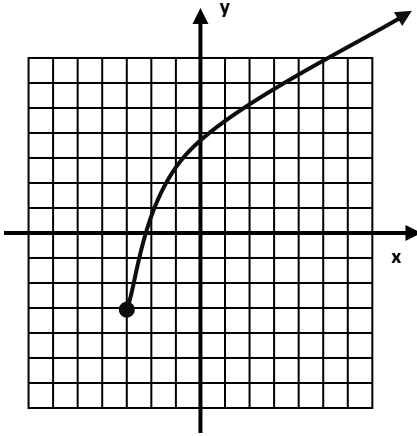


1.4 & 1.5 Solutions:

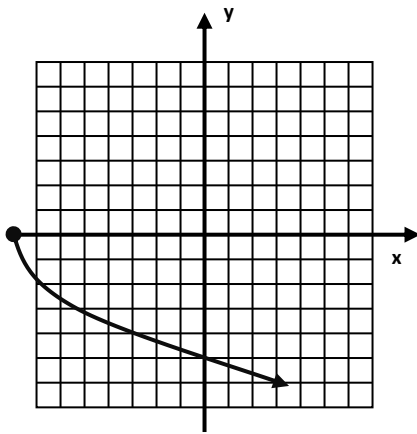
- 59) $y = -\frac{4}{7}x + \frac{36}{7}$ 60) $y = \frac{3}{5}x - \frac{44}{5}$ 61) $y = -\frac{3}{2}x + 1$
 62) $y = \frac{2}{3}x - 1$ 63) $y = 6$ 64) $x = -1$
 65) $y = -5$ 66) 4 67) 7
 68) $\frac{1}{5}$

1.6 Solutions:

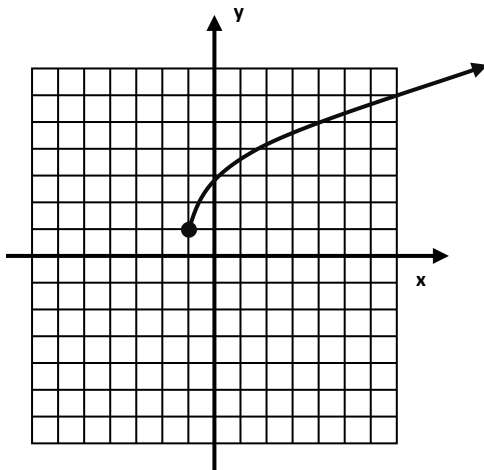
69) Vertical stretch by a factor of 2, Vertical shift down 3 units.



70) Horizontal shift left 5 units, Reflection on the x-axis.

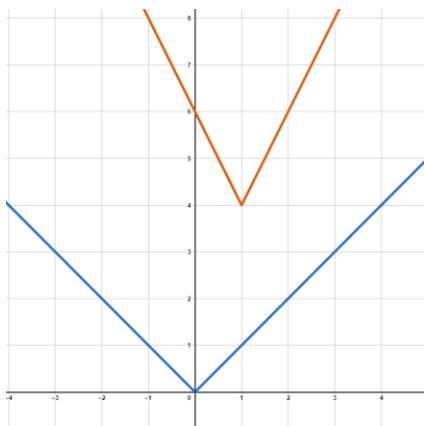


71) Horizontal shift right 2 units, Vertical shift up 1 unit.

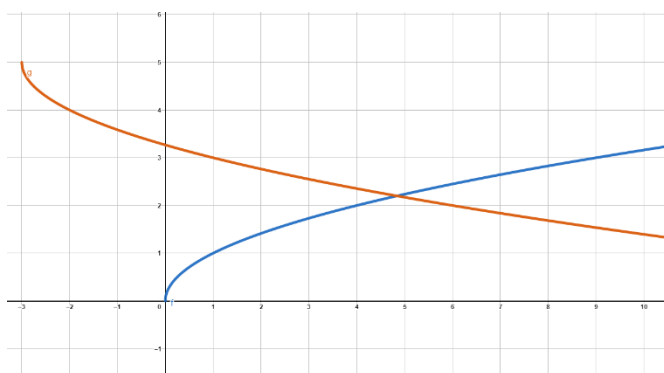


1.6 Solutions Continued:

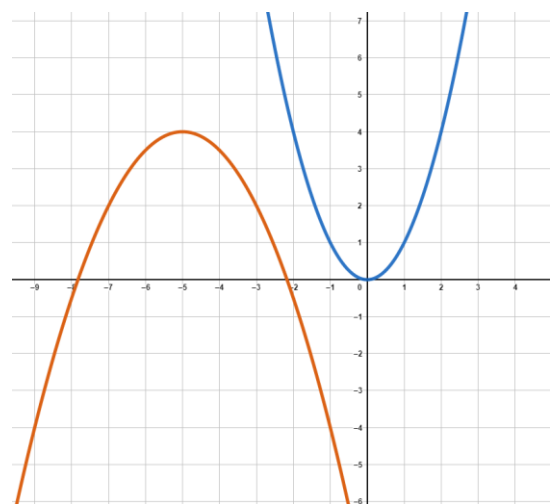
72)



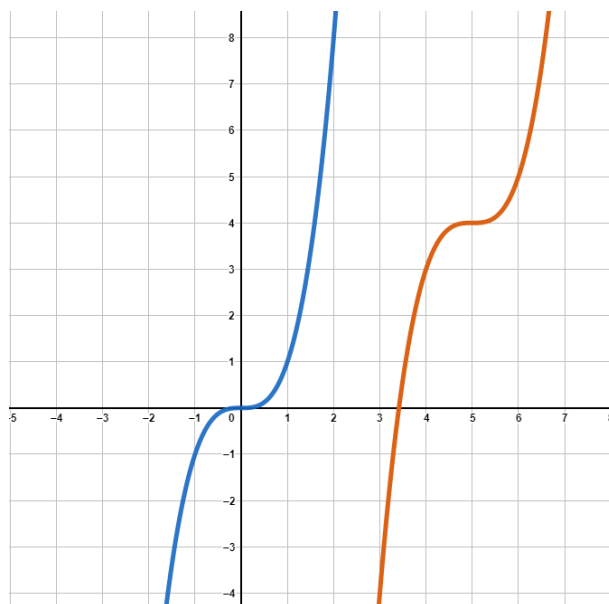
73)



74)



75)



1.7 Solutions:

76) -1

77) $x^2 + 3x - 4$

78) $x^2 - 3x + 6$

79) 10

80) $9x^2 - 30x + 26$

81) 0

82) -1

83) 1

84) 2

85) 2

1.8 Solutions:

86) $f^{-1}(x) = \frac{x+8}{2} = \frac{1}{2}x + 4$

87) $f^{-1}(x) = \frac{3}{2}x - \frac{1}{2} = \frac{3x-1}{2}$

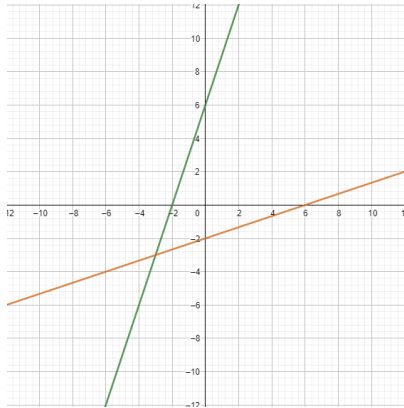
88) $f^{-1}(x) = \frac{-x-2}{2x-3} = \frac{x+2}{3-2x}$

89) $f^{-1}(x) = x^5 + 3$

90) $f^{-1}(6) = 7$

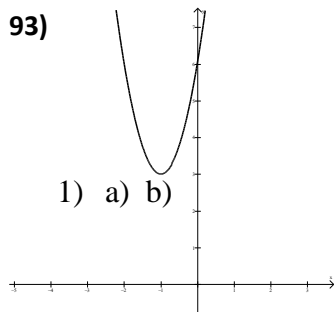
91) $g^{-1}(2) = 7$

92)

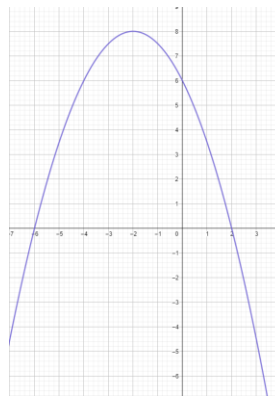


2.2 Solutions:

93)



94)



95A) \$500

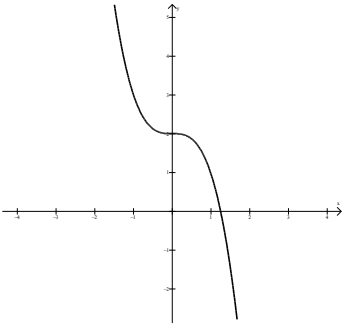
95B) \$1,000,000

96) \$450 with 1500 cans

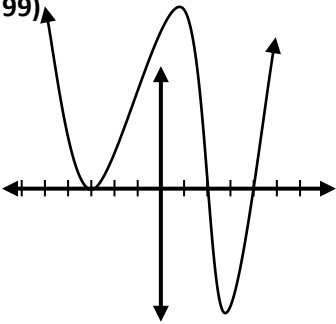
97) After about 7.5 years; in the year 2011

2.3 Solutions:

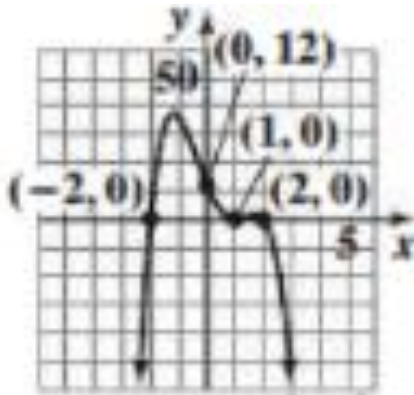
98)



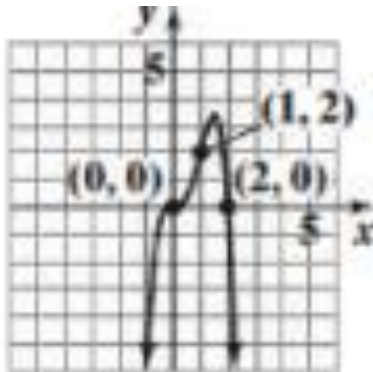
99)



100)



101)



102) Falls to the left and rises to the right

103) Falls to the left and falls to the right

2.4 Solutions:

104) $2x^2 - x - 3 - \frac{4}{x-3}$

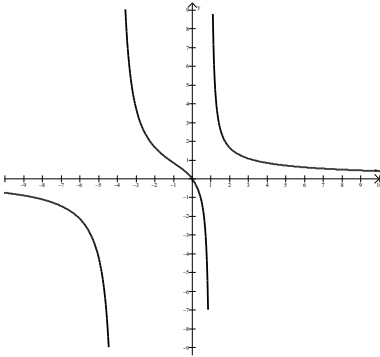
105) $6x - 2 + \frac{4}{x-4}$

106) $P(-2) = 5$

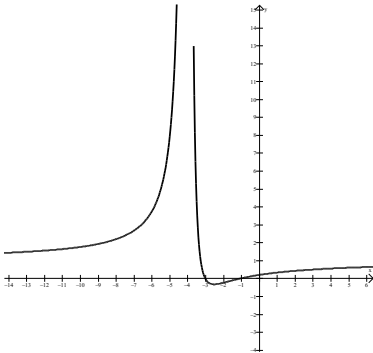
107) $P(1) = 0; P(-3) = 0$

2.6 Solutions:

108)



109)



110) $y = 0$

111) $y = 1$

112) $y = x - 1$

113) $y = x^2$

114) $\left(3, \frac{1}{3}\right)$

115) $(2, 4)$

2.7 Solutions:

116) $(-\infty, 2) \cup (5, \infty)$

117) $[1, 4]$

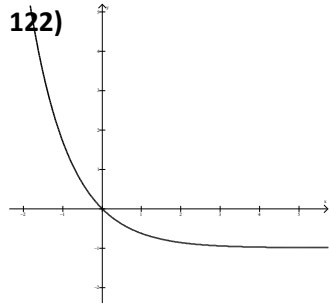
118) $(2, 8]$

119) $(-3, 7]$

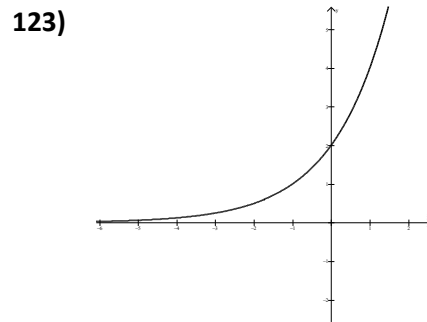
120) $(-\infty, -\frac{1}{3}) \cup (7, \infty)$

121) $(-4, -2)$

3.1 Solutions:



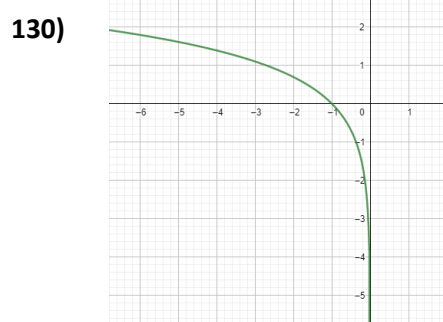
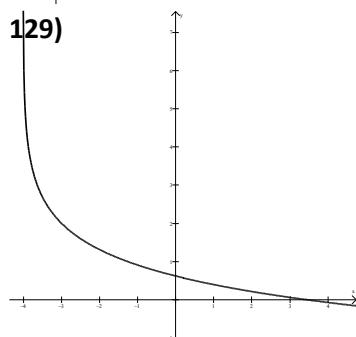
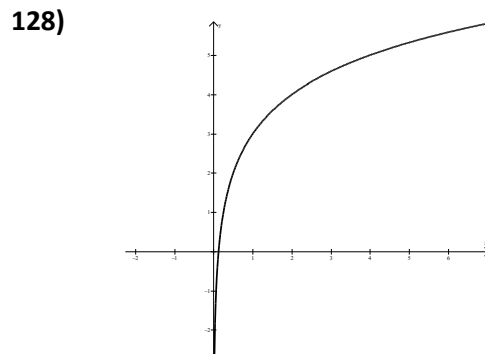
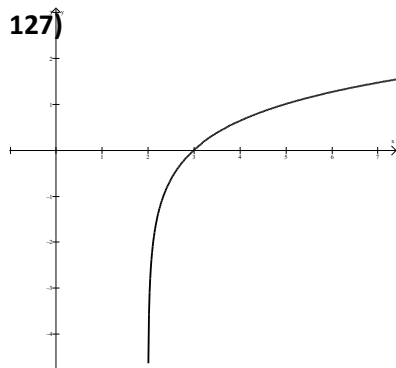
124) $y = 6^x$



125) $y = e^{-x}$

126) \$13,728,05

3.2 Solutions:



131) 83

132) $\frac{1}{25}$

133) $(2, \infty)$

134) $(-\infty, 0)$

3.3 Solutions:

- 135) 3 136) -2 137) $\frac{5}{3}$ 138) -2
- 139) $2x$ 140) $\frac{1}{3}$ 141) 2 142) 2
- 143) 2.8163 144) 2.9534 145) 3.5007 146) -12.1359

3.4 Solutions:

- 147) $x = 1$ 148) $x = 3$ 149) $x = 4$ 150) $x = \frac{2}{3}$
- 151) \emptyset 152) $x = -1, 8$ 153) $x = 35$
- 154) $x = \frac{\ln 17}{\ln(.25)} = \frac{\log 17}{\log(.25)}$ 155) $x = \frac{7 \ln 6}{\ln 7 - \ln 6} = \frac{7 \ln 6}{\ln\left(\frac{7}{6}\right)} = \frac{7 \log 6}{\log 7 - \log 6} = \frac{7 \log 6}{\log\left(\frac{7}{6}\right)}$
- 156) $x = \frac{50}{3}$ 157) $x = \frac{1 + \ln 5}{3}$ 158) $x = 5$ 159) $x = \frac{125}{4}$

3.5 Solutions:

- 160) 8842 million 161) About 27.5 hours 162) Monthly about 6.775 yrs Continuously ≈ 6.758 yrs
- 163) About \$13,954 164) Almost 14 years 165) About 55.668 grams
- 166a) 16 moose 166b) About 73 moose 166c) 160 moose 166d) About 20 years

7.1 Solutions:

- 167) (5, -4) 168) (1, -1) 169) Infinitely many solutions
- 170) No Solution 171) $x = 7; y = 4$ 172) $x = 2; y = 2$
- 173) boat speed: 20 km/h; Current speed: 3 km/h 174) Pan Pizza: 1120 cal; Beef Burrito: 430 calories
- 175) 533.75 acres 176) copper: 10.2 kg; tin: 5.1 kg

7.2 Solutions:

- 177) (1, 0, -1) 178) (2, 3, -2) 179) (1, -3, 2)
- 180) No Solution
- 181) \$30,000 for short- and intermediate term each; \$40,000 for long-term
- 182) 250 acres of corn; 500 acres of wheat; 450 acres of soybeans
- 183) 4500 gallons of Regular; 500 gallons of Performance Plus; 1500 gallons of Premium