MATH 135 – Sample Review for the Final Exam

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 of 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.

PART I: Short Answer Section

1) True or False: $(a+b)^2 = a^2 + b^2$ If false, what would make the statement true?

2) True or False: $\dfrac{4+\sqrt{3}}{2} = 2+\sqrt{3}$ If false, what would make the statement true?

3) True or False: $e^x \cdot e^x = e^{2x}$ If false, what would make the statement true?

4) True or False: $e^x + e^x = e^{2x}$ If false, what would make the statement true?

5) True or False: $\log_2 x + \log_2 5 = \log_2 (5x)$ If false, what would make the statement true?

6) True or False: $\ln x - \ln 6 = \dfrac{\ln x}{\ln 6}$ If false, what would make the statement true?

7) What is the relationship of the lines $y = 3x - 2$ and $y = 3x + 5$?

8) What do you know about the lines $y = \dfrac{2}{3}x$ and $y = -\dfrac{3}{2}x + 1$?

9) Can a function have two *y*-intercepts? Explain.

10) If for function f, $f(10) = -19$, then to what point does $(10, f(10))$ correspond?

11) Determine the *y*-intercept for $y = x^2 - x - 6$, if any.

12) Determine the *x*-intercept for $y = x^2 - x - 6$, if any.

13) Determine the *y*-intercept for $f(x) = \log_2 (x+2)$, if any.

14) Determine the *x*-intercept for $f(x) = \log_2 (x+2)$, if any.

15) Can a parabola of the form $y = ax^2 + bx + c$ have an inverse function over its entire domain? Why or why not?

16) If $f(2) = 5$, then $f^{-1}(5) =$ _____.

17) If the point $(3, -10)$ lies on the graph of $f(x)$, give a point of $f^{-1}(x)$.

18) If $f(x)$ has domain $\{2, 3, 4, 5\}$ and range $\{4, 9, 16, 25\}$, what is the domain of $f^{-1}(x)$?

19) Is $x = 10$ in the domain of $f(x) = \sqrt{3-x}$?

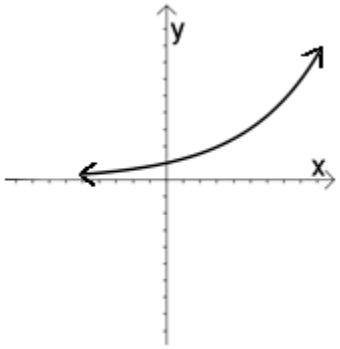
20) What is the domain of $y = x^2 - 4$?

21) What is the range of $y = x^2 - 4$?

22) Does the graph to the right represent a function? Explain.

23) Give the domain of the graph to the right.

24) Give the range of the graph to the right.



25) Sketch any one-to-one function.

26) Sketch any function that is not one-to-one.

27) How does the graph of $y = |x-3|+5$ compare to $y = |x|$?

28) What is the minimum value of $f(x) = x^2 + 3$? Explain.

29) Does the graph of $y = \dfrac{x-8}{x-2}$ cross the line $x = 2$? Explain.

30) What are the asymptotes of $y = \dfrac{2x-1}{3x-5}$?

31) Does $y = ax^2 + bx + c$ have a maximum or minimum value when $a < 0$? Explain. What is that value?

32) Write a quadratic equation in standard form $\left(ax^2 + bx + c = 0\right)$ whose solution set is $\{-2, 7\}$.

33) Write $\log_4 a + \log_4 b$ as a single logarithm.

34) Evaluate $\log_b \sqrt{b}$

35) Evaluate $\log_a\left(\dfrac{1}{a}\right)$

36) Evaluate $\log_m 1$

37) What is the relationship of $f(x) = \log_2 x$ and $g(x) = 2^x$?

38) Without a calculator, determine between what two consecutive integers will you find $\log_2 10$.

39) Does the model $A(t) = 90e^{-0.01t}$ represent exponential growth or decay? Explain.

40) Write an equation to represent the following statement: "*y* varies jointly with *x* and *z*."

41) Write an equation to represent the following statement: "*m* varies inversely with *n*."

42) The imaginary number *i* has the property $i^2 =$ _____.

43) For the complex number $3 + 4i$ the real part is _____ and the imaginary part is _____.

44) If a system of linear equations in two variables has no solution, then the lines are _____.

45) If a system of linear equations has exactly one solution, then the lines _____.

46) If a system of linear equations has infinitely many solutions, then the lines are _____.

PART II: Constructed Response Section – problems require work to support answers.

Problems 47 – 54. Give the domain of each function.

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

48) $h(x)=\dfrac{x-1}{x-5}$

49) $g(x)=\sqrt{3-x}$

50) $L(x)=\log(x-8)$

51) $k(x)=4x^2+5$

52) $R(x)=\dfrac{5x}{x^2-1}$

53) $d(x)=\dfrac{3x+1}{x^2+4}$

54) $P(x)=5x-1$

Problems 55 – 62. Evaluate without a calculator.

55) $\log_5 125$

56) $\log_9\left(\dfrac{1}{81}\right)$

57) $\log_8 32$

58) $\log 0.01$

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

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

61) $\log_3 36-\log_3 4$

62) $\log_7 1+\log_3 9$

Problems 63 – 67. Perform the indicated operation and write each expression in the form *a + bi*.

63) $(14+2i)+(1-4i)$

64) $8i-(5-9i)$

65) $-3i(-4+7i)$

66) $(2+7i)(2-7i)$

67) $(5-4i)^2$

Problems 68 – 83. Solve each equation. Leave all answers exact. DO NOT ROUND.

68) $2^{2x+1}=8$ (Solve without using logarithms.)

69) $3^{5-3x}=\dfrac{1}{81}$ (Solve without using logarithms.)

70) $(x+3)^2=25$

71) $x^2=2x+1$

72) $x-13\sqrt{x}+40=0$

73) $\left(p^2-3p\right)^2=8\left(p^2-3p\right)+20$

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

75) $2y^{\frac{2}{5}}-5y^{\frac{1}{5}}-3=0$

76) $x(x-4)=-29$

77) $\log_2 x=-3$

78) $\sqrt{29-2x}+7=x$

79) $3x^{-2}+10x^{-1}=8$

80) $\log_x 64=3$

81) $\log_x\left(\dfrac{8}{27}\right)=3$

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

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

Problems 84 – 89. Solve each equation. Leave all answers exact. DO NOT ROUND.

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

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

86) $8^x=6^{x+7}$

87) $\ln(x+6)+\ln 6=\ln x$

88) $5e^{3x-1}=25$

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

Problems 90 – 98. Solve each system of equations. Write solutions as ordered pairs.

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

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

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

93) $\begin{cases} x+y+1=0 \\ x^2+y^2-x+6y=-5 \end{cases}$

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

95) $\begin{cases} x^2+y^2=6y+20 \\ y^2=4 \end{cases}$

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

97) $\begin{cases} 4x^2-3xy+9y^2=15 \\ 2x+3y=5 \end{cases}$

98) $\begin{cases} x^2-3x+y^2+y=-2 \\ \dfrac{x^2-x}{y}+y+1=0 \end{cases}$

Problems 99 – 106. Solve each inequality. Write solutions using interval notation.

99) $|3x-5|+9>2$

100) $|3x-2|+1\le 4$

101) $x^2+3x\le 28$

102) $6-|2x+7|<1$

103) $x^2(x-7)(x+9)^3>0$

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

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

106) $\frac{x}{x-2}\le\frac{4}{x+10}$

Problems 107 – 111. Write the equation of a line that satisfies the given conditions.

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

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

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

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

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

Problems 112 – 115. Find the average rate of change of the following functions from one *x*-value to another.

112) $f(x) = -x^2 - 5x + 2$ from -1 to 4

113) $g(x) = \dfrac{\sqrt{x+3}}{x-7}$ from 1 to 6

114) $h(x) = -2x + 11$

115) $k(x) = \log_2(x+6)$ from $-5\frac{1}{2}$ to 10

Problems 116 – 125. Evaluate and simplify the given values of these functions.

$$f(x) = x^2 + 1 \qquad g(x) = 3x - 5 \qquad h(x) = \begin{cases} 3x & \text{if } x < 0 \\ x - 2 & \text{if } 0 \le x \le 10 \\ 5 & \text{if } x > 10 \end{cases}$$

116) $h(12)$

117) $h(0)$

118) $g(t+1)$

119) $f(3x)$

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

121) $(f+g)(x)$

122) $(f-g)(x)$

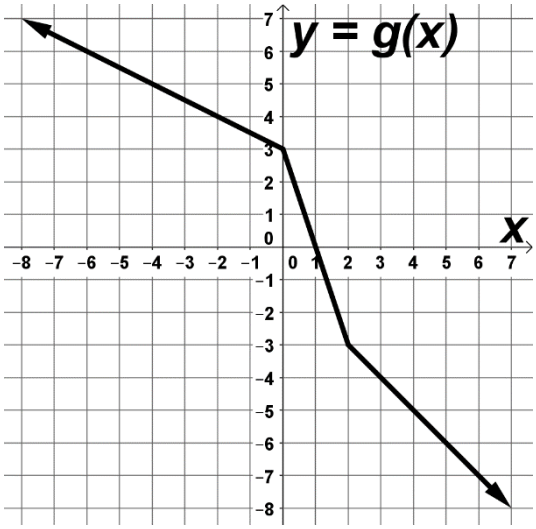
123) $(g \circ f)(2)$

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

125) $g^{-1}(2)$

Problems 126 – 134. Find the given values of these functions.

x	–6	–4	–2	0	1	2	3	4	5	6
f(x)	1	–2	3	6	2	–6	5	–4	0	4



126) $(f+g)(3)$

127) $(fg)(-6)$

128) $\left(\dfrac{g}{f}\right)(5)$

129) $(f \circ g)(-2)$

130) $(f \cdot g)(0)$

131) $f^{-1}(4)$

132) $g^{-1}(-4)$

133) $\left(f \circ g^{-1}\right)(0)$

134) $\left(f^{-1} \circ f^{-1}\right)(1)$

Problems 135 – 138. Find the equation of the inverse function for each one-to-one function.

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

136) $f(x) = 2 + \log_5(x - 1)$

137) $f(x) = \dfrac{3x - 2}{2x + 1}$

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

Problems 139 – 141. Write the equation that relates the quantities given. DO NOT SOLVE.

139) Express the area, *A*, of a rectangle as a function of the width, *x*, if the length is twice the width of the rectangle.

140) A commissioned sales person earns $100 base pay plus $10 per item sold. Express her gross salary, *G*, as a function of the number of items sold, *x*.

141) The illumination, *I*, produced on a surface by a source of light varies directly with the candlepower, *c*, of the source and inversely with the square of the distance, *d*, between the source and the surface.

Problems 142 – 151. Solve each problem. Be sure to identify the variables and give the equation used to solve each problem.

142) The difference between the squares of two real numbers is 3. Twice the square of the first number increased by the square of the second number is 9. Find the numbers.

143) The product of two real numbers is 10 and the difference of their squares is 21. Find the numbers.

144) The illumination provided by a car's headlight varies inversely with the square of the distance from the headlight. A car's headlight produces an illumination of 3.75 foot candles at a distance of 40 feet. What is the illumination when the distance is 50 feet?

145) The electrical resistance *R* of a wire varies directly with its length *L* and inversely with the square of its diameter *d*. A wire 100 feet long of diameter 0.01 inch has a resistance of 25 ohms. Find the resistance of a wire made of the same material that has a diameter of 0.015 inch and is 50 feet long.

146) A pool measuring 10 meters by 20 meters is surrounded by a walkway of uniform width. If the area of the pool and the walkway combined is 600 square meters, what is the width of the walkway?

147) Find the length and width of a rectangle whose perimeter is 36 feet and whose area is 77 square feet.

148) 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.

149) 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.

150) 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?

151) 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 kilograms of copper and tin required to make 15.3 kg of bronze.

Problems 152 – 161. Solve each problem. Be sure to identify the variables and give the equation used to solve each problem.

152) The net income, *y*, (given in millions of dollars) of Pet Products Unlimited from 2010 to 2012 is modeled by the function $y = 9x^2 + 15x + 52$, where *x* represents the number of years after 2010. Assume this trend continues and predict the year in which Pet Products Unlimited's net income will be \$598 million.

153) Suppose that the manufacturer of a gas clothes dryer has found that the revenue R, in dollars, can be modeled by a function of the unit price, $R(p) = 4000p - 4p^2$, where the unit price is *p* dollars. What unit price should be established for the dryer in order to maximize the revenue? What is the maximum revenue?

154) Since 1950, the growth in the world population in millions closely fits the exponential function $P(t) = 2600e^{0.018t}$, where *t* is the number of years since 1950. Estimate the population in the year 2035, to the nearest million.

155) 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 number of hours between injections?

156) If Andrew has \$1800 to invest at 6% per year compounded monthly, how many years will it be before he has \$2700? How many years will it take if it is compounded continuously? Round your answers to 3 decimal places.

157) Selina estimates that she will require \$20,000 in four years in order to return to college to get an MBA degree. How much money should she invest now if it to earn 4.25% compounded continuously?

158) How long will it take Quenton to double his investment if he plans to put it in an account earning 5% annually and is compounded quarterly?

159) The half-life of silicon-32 is 710 years. If 100 grams is present now, how much will be present in 600 years? Round your answer to 3 decimal places.

160) The life expectancy of a newborn child in Madagascar can be modeled by a linear function. In 1985 the life expectancy of a newborn child in Madagascar was 50 years. By 2000 the life expectancy had risen to 58 years.

a) Let $t = 0$ represents the number of years after 1975 and $L(t)$ represent the life expectancy, to write a linear function that models the life expectancy of a newborn child in Madagascar *t* years after 1975.

b) Interpret the meaning of the slope of the linear model from part a).

c) Interpret the meaning of the *L*-intercept of the linear model from part a).

161) For individuals filing their 2014 income taxes as Single and having no more than \$89,350 of taxable income, the tax bill was calculated as follows: 10% of their taxable income up to \$9075, plus 15% of any taxable income between \$9075 and \$36,900, plus 25% of any taxable income between \$36,900 and \$89,350.

a) Write a piecewise-defined function $T(x)$ that computes the 2014 tax bill for a single filer with taxable income less than or equal to \$89,350, as a function of the taxable income *x*.

b) What is the tax bill for a single filer with taxable income of \$8,000, of \$32,000, of \$89,000?

Problems 162 – 176. Graph each of the following functions. Be sure to identify key points and all asymptotes, if they exist.

162) $5y = 10 - 3x$

163) $y = \dfrac{2x+9}{3}$

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

165) $y = \dfrac{-5}{2-3x}$

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

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

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

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

170) $f(x) = \dfrac{5x}{x^2 + 3x - 4}$

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

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

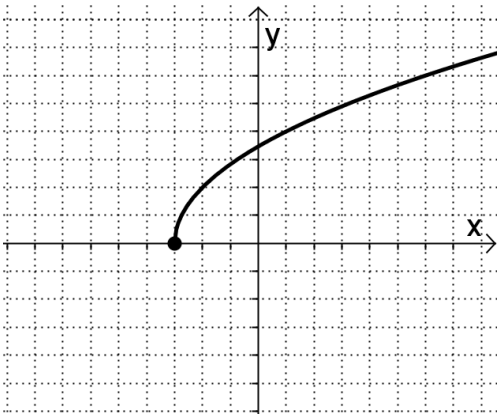
173) $f(x) = \log_2 x + 3$

174) $f(x) = 2 - \ln(x+4)$

175) $f(x) = \dfrac{x^2 - 4}{x^2 - 9}$

176) $f(x) = \begin{cases} \dfrac{2}{3}x & \text{if } x \le 2 \\ 4 & \text{if } x > 2 \end{cases}$

Problems 177 – 180. Given the graph of *y = f(x)* to the right, describe the transformation(s) used to graph the following functions. Then graph the functions.



177) $y = f^{-1}(x)$

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

179) $y = f(x-2)+1$

180) $y = 2f(4-x)-3$

Problems 181 – 186. Give all asymptotes, *x*-intercepts, and *y*-intercepts for the following functions. Write asymptotes as equations of lines. Write intercepts as ordered pairs. If there is none, write "none".

181) $f(x) = \dfrac{x^2 + x}{x^2 - 5x - 14}$

182) $f(x) = \dfrac{4}{3}\left(x - \dfrac{1}{2}\right)^6 + 8$

183) $f(x) = 8 + 2\left(\dfrac{5}{3}\right)^{x+2}$

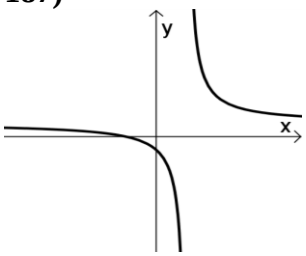
184) $f(x) = \dfrac{(x-3)^2}{x}$

185) $f(x) = \dfrac{x}{x^2 + 2}$

186) $f(x) = 6 - \log_8(x+3)$

Problems 187 – 196. Matching. Identify each of the following graphs as a type of function.

187)



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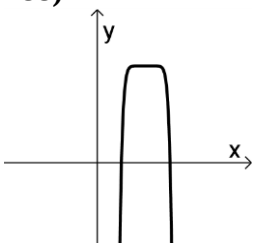

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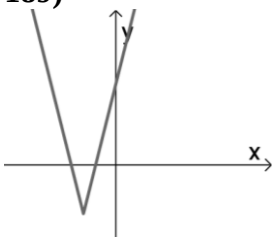

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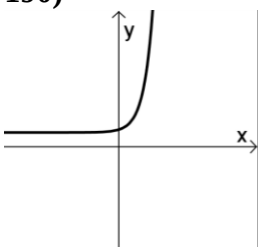

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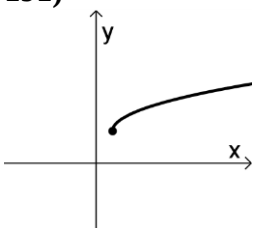

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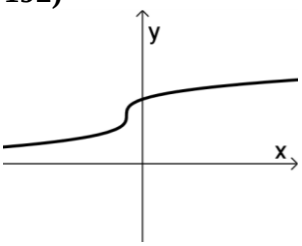

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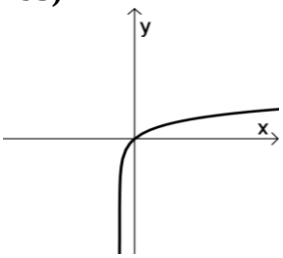

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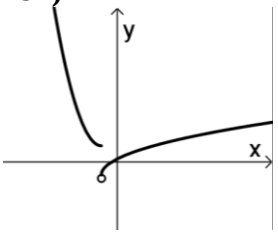

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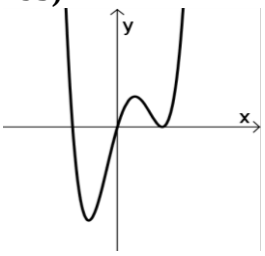

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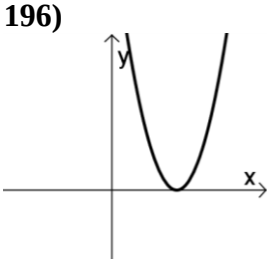


A. linear function

B. absolute value function

C. quadratic function

D. cubic function

E. piecewise-defined function

F. square root function

G. cube root function

H. power function

I. polynomial function

J. rational function

K. exponential function

L. logarithmic function

Problems 197 – 217. Match each function to its graph, A – U, on one of the next two pages.

197) _____ $f(x)=\dfrac{2x-5}{2x+3}$

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

199) _____ $f(x)=\dfrac{1}{2}x(x+2)(x-2)^2$

200) _____ $f(x)=\dfrac{x-9}{3}$

201) _____ $f(x)=2\log_3(x-1)+1$

202) _____ $f(x)=\dfrac{1}{3}(x-3)^2$

203) _____ $f(x)=\dfrac{1}{3}(x-2)^6+1$

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

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

206) _____ $f(x)=\dfrac{1}{2}x(x+2)^2(x-2)$

207) _____ $f(x)=\dfrac{2x+3}{2x-5}$

208) _____ $f(x)=-\dfrac{1}{3}(x+2)(x-2)^2$

209) _____ $f(x)=2\log_3(x+1)-1$

210) _____ $f(x)=2(3)^{x+1}-1$

211) _____ $f(x)=\dfrac{5-2x}{2x+3}$

212) _____ $f(x)=\dfrac{9-x}{3}$

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

214) _____ $f(x)=\dfrac{1}{3}(x+2)(x-2)^2$

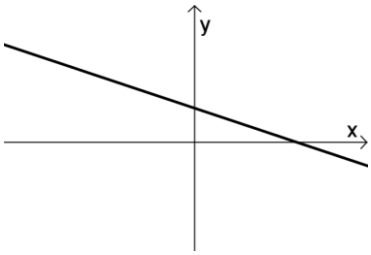
215) _____ $f(x)=-\dfrac{1}{3}(x-2)^6+1$

216) _____ $f(x)=2(3)^{x-1}+1$

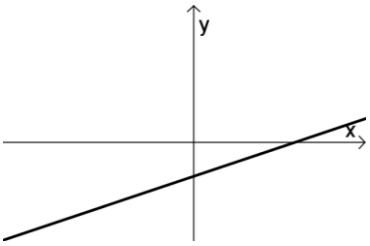
217) _____ $f(x)=-\dfrac{1}{3}(x+1)^6-2$

Graphs A – U. Match some of these graphs to the functions in Problems 197 – 217.

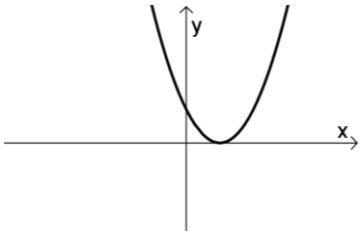
A.



B.



C.



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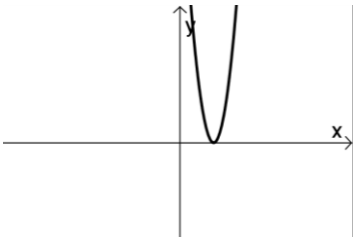

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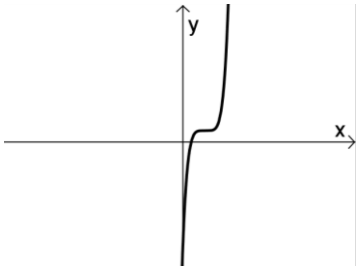

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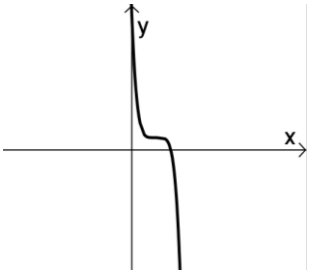

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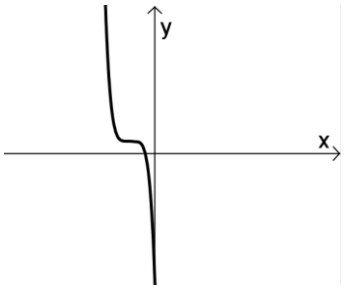

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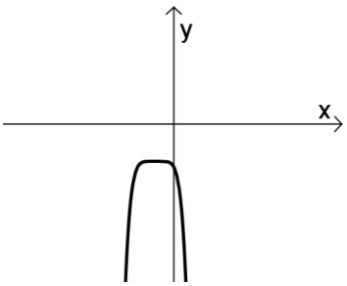

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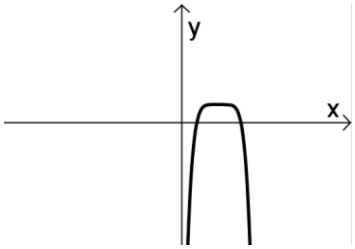

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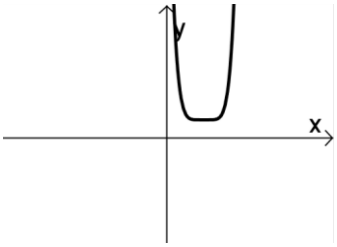

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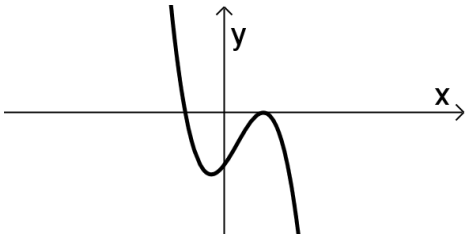

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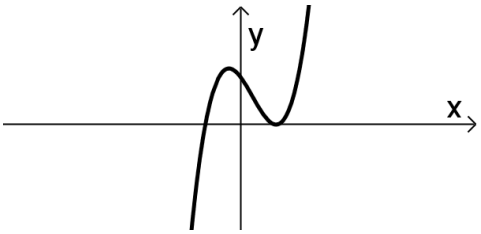

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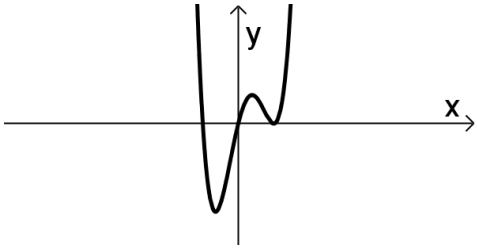

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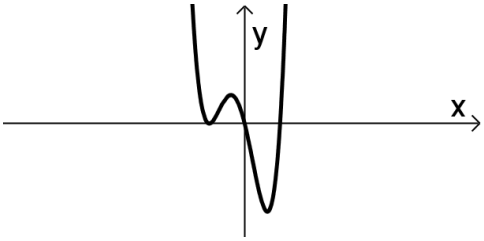

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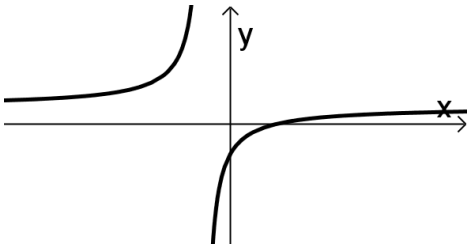

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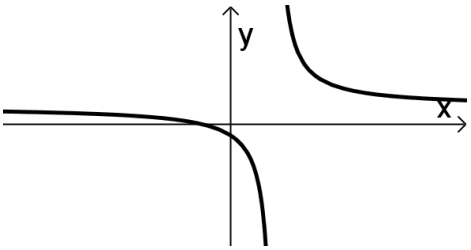

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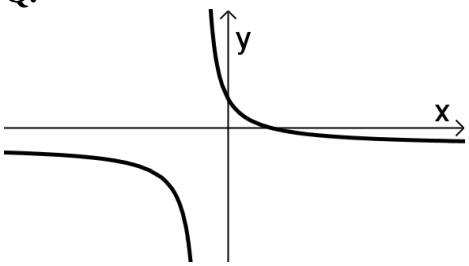

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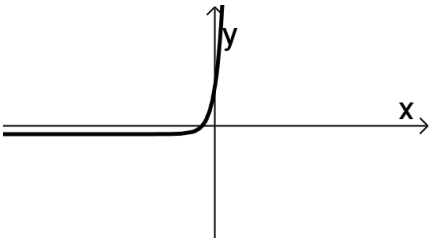

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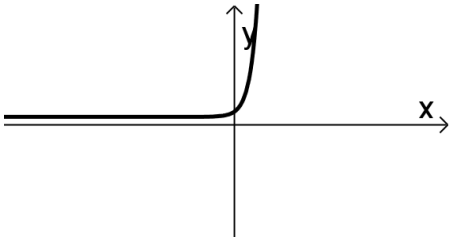
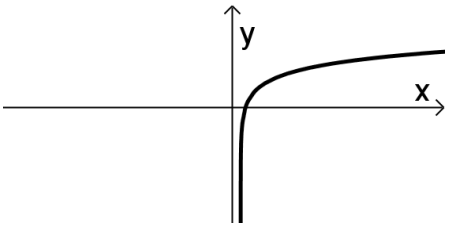


T.



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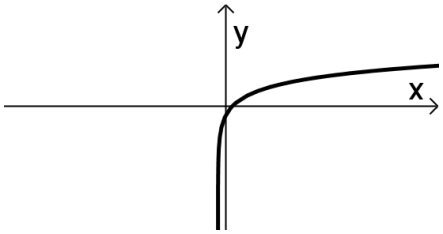


SOLUTIONS

PART I: SHORT ANSWER SECTION

1) False

2) False

3) True

4) False

5) True

6) False

7) They are parallel.

8) They are perpendicular.

9) No. The number 0, from the domain, would be paired with two different values of the range.

10) $(10,-19)$

11) $(0,-6)$

12) $(3,0)$ and $(-2,0)$

13) $(0,1)$

14) $(-1,0)$

15) No. A parabola is not a one-to-one function.

16) 2

17) $(-10,3)$

18) $\{4,9,16,25\}$

19) No. The range contains only real numbers.

20) $(-\infty,\infty)$

21) $[-4,\infty)$

22) Yes

23) $(-\infty,\infty)$

24) $(0,\infty)$

25) Any graph that passes both the vertical line test and horizontal line test.

26) Any graph that passes the vertical line test but not the horizontal line test.

27) It is shifted to the right 3 units and shifted up 5 units.

28) Minimum = 3; explanation required

29) No. 2 is not in the domain of the function because of division by 0.

30) HA: $y=\frac{2}{3}$; VA: $x=\frac{5}{3}$

31) Maximum

32) an example is $x^2-5x-14=0$

33) $\log_4(ab)$

34) $\frac{1}{2}$

35) -1

36) 0

37) They are inverse functions of each other.

38) 3 and 4 because $\log_2 8<\log_2 10<\log_2 16$

39) Decay because the coefficient of t is negative.

40) $y = kxz$

41) $m=\frac{k}{n}$

42) -1

43) 3; 4

44) parallel

45) intersect

46) the same line

PART II: THESE ANSWERS MUST BE SUPPORTED WITH APPROPRIATE WORK

47) $\left[-\frac{2}{3},\infty\right)$

48) $(-\infty,5)\cup(5,\infty)$

49) $(-\infty,3]$

50) $(8,\infty)$

51) $(-\infty,\infty)$

52) $(-\infty,-1)\cup(-1,1)\cup(1,\infty)$

53) $(-\infty,\infty)$

54) $(-\infty,\infty)$

55) 3

56) -2

57) $\frac{5}{3}$

58) -2

59) $2x$

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

61) 2

62) 2

63) $15-2i$

64) $-5+17i$

65) $21+12i$

66) 53

67) $9-40i$

68) 1

69) 3

70) $-8,\ 2$

71) $1-\sqrt{2},\ 1+\sqrt{2}$

72) 25, 64

73) $-2,\ 1,\ 2,\ 5$

74) $\frac{125}{4}$

75) $-\frac{1}{32},\ 243$

76) $2+5i,\ 2-5i$

77) $\frac{1}{8}$

78) 10

79) $-\frac{1}{4},\ \frac{3}{2}$

80) 4

81) $\frac{2}{3}$

82) No solution

83) $-1,\ 8$

84) 35

85) $\frac{\ln 17}{\ln\left(\frac{1}{4}\right)}=-\frac{\ln 17}{\ln 4}$

86) $\frac{7\ln 6}{\ln 8-\ln 6}$

87) No solution

88) $\frac{1+\ln 5}{3}$

89) 5

90) $(5,4)$

91) $(1,-1)$

92) $(0,3)$

93) $(0,-1),\left(\frac{5}{2},-\frac{7}{2}\right)$

94) $\left\{(x,y)\,\middle|\,3x-12y=6\right\}$

95) $\left(2\sqrt{7},2\right),\left(-2\sqrt{7},2\right),$
$(2,-2),(-2,-2)$

96) No solution

97) $\left(\frac{1}{2},\frac{4}{3}\right),\left(2,\frac{1}{3}\right)$

98) $(1,-1)$

99) $(-\infty,\infty)$

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

101) $[-7,4]$

102) $(-\infty,-6)\cup(-1,\infty)$

103) $(-\infty,-9)\cup(7,\infty)$

104) $(2,8]$

105) $\left(-\infty,-\frac{1}{3}\right)\cup(7,\infty)$

106) $(-10,-4]\cup[-2,2)$

107) $y=\frac{3}{5}x-\frac{44}{5}$

108) $y=-\frac{3}{2}x+1$

109) $y=\frac{2}{3}x-1$

110) $x=-1$

111) $y=-5$

112) -8

113) $-\frac{8}{15}$

114) -2

115) $\frac{10}{31}$

116) 5

117) -2

118) $3t-2$

119) $9x^2+1$

120) -1

121) x^2+3x-4

122) x^2-3x+6

123) 10

124) $9x^2-30x+26$

125) $\frac{7}{3}$

126) 1

127) 6

128) undefined

129) -4

130) 18

131) 6

132) 3

133) 2

134) 2

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

136) $f^{-1}(x)=5^{x-2}+1$

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

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

139) $A(x) = 2x^2$

140) $G(x) = 100 + 10x$

141) $I = \dfrac{kc}{d^2}$

142) 2 and 1, 2 and –1, –2 and 1, –2 and –1

143) $(5, 2)$, $(-5, -2)$

144) 2.4 foot candles

145) $\dfrac{50}{9} \approx 5.56$ ohms

146) 5 meters

147) 11 feet by 7 feet

148) Pan pizza 1120 calories
Beef burrito 430 calories

149) Boat 20 kph, Stream 3 kph

150) 533.75 acres

151) Copper 10.2 kg, Tin 5.1 kg

152) During year 2017

153) \$500; \$1,000,000

154) 12,007 million

155) 27.5 hours

156) 6.775 years; 6.758 years

157) \$16,873.30

158) 13.95 years

159) 55.668 grams

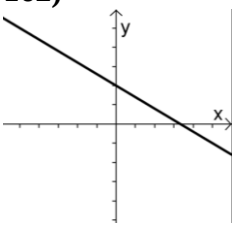
160) **a)** $L(x) = \dfrac{8}{15}x + \dfrac{134}{3}$
or $L(x) = 0.53x + 44.67$

b) The life expectancy of a newborn in Madagascar increased by approximately 0.53 years each year after 1975.

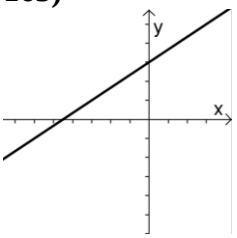
c) In 1975 the life expectancy of a newborn in Madagascar was approximately 44.67 years.

161) see answer after # 217

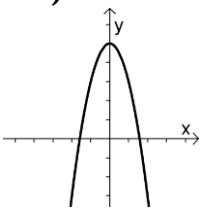
162)



163)

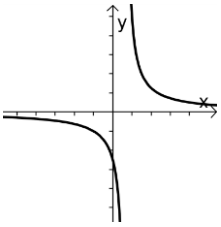


164)

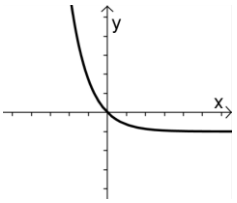


165) HA: $y = 0$

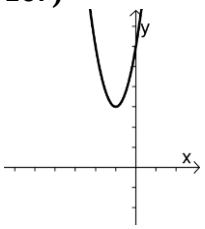
VA: $x = \dfrac{2}{3}$



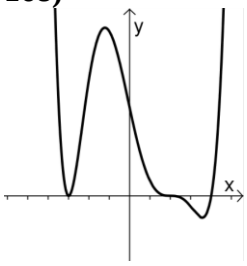
166) HA: $y = -1$



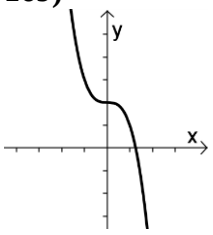
167)



168)

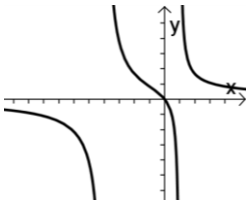


169)

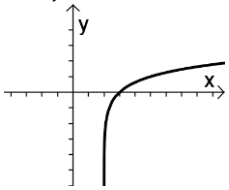


170) HA: $y = 0$

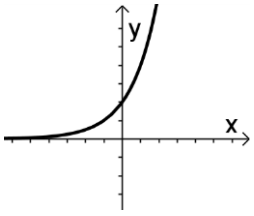
VA: $x = -4,\ x = 1$



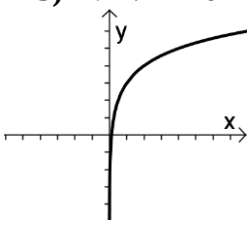
171) VA: $x = 2$



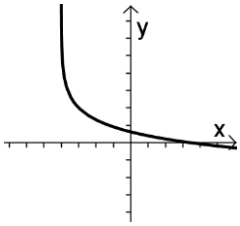
172) HA: $y = 0$



173) VA: $x=0$

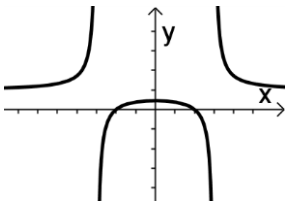


174) VA: $x=-4$



175) HA: $y=1$

VA: $x=-3, x=3$



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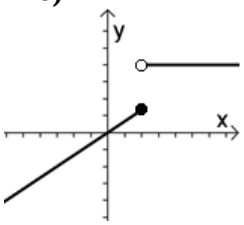

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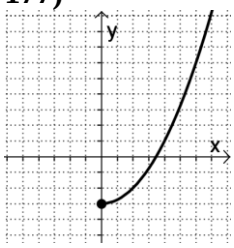
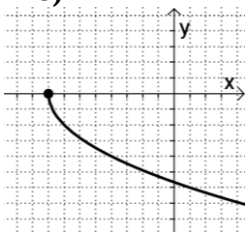


178)



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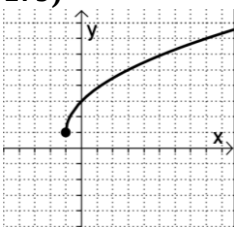
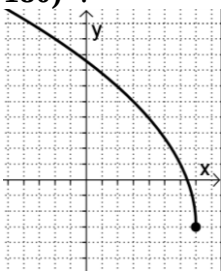


180) .



181) HA: $y=1$;
VA: $x=-2,\ x=7$;
Int: $(-1,0),(0,0)$

182) HA: none; VA: none;
Int: $\left(0,\frac{385}{48}\right)$

183) HA: $y=8$; VA: none;
Int: $\left(0,\frac{122}{9}\right)$

184) HA: none; VA: $x=0$;
Int: $(3,0)$

185) HA: $y=0$; VA: none;
Int: $(0,0)$

186) HA: none; VA: $x=-3$;
Int: $(262141,0)$,
$(0,\ 6-\log_8 3)$ or
$\left(0,\ 6-\frac{\ln 3}{\ln 8}\right)$

187) J
188) H
189) B
190) K
191) F
192) G
193) L
194) E
195) I
196) C
197) O
198) F
199) M
200) B
201) T
202) C
203) J
204) G
205) D
206) N
207) P
208) K
209) U
210) R
211) Q
212) A
213) E
214) L
215) I
216) S
217) H

161) a) $T(x)=\begin{cases} 0.1x, & \text{for } 0\le x\le 9075 \\ 907.5+0.15(x-9075), & \text{for } 9075<x\le 36900 \\ 5081.25+0.25(x-36900), & \text{for } 36900<x\le 89350 \end{cases}$

b) \$800, \$4346.25, \$18,106.25