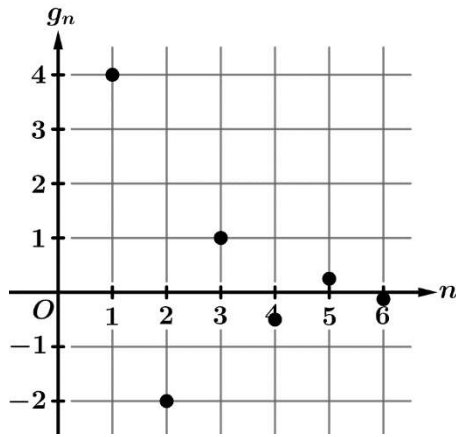


AP Precalculus Unit 2 Review



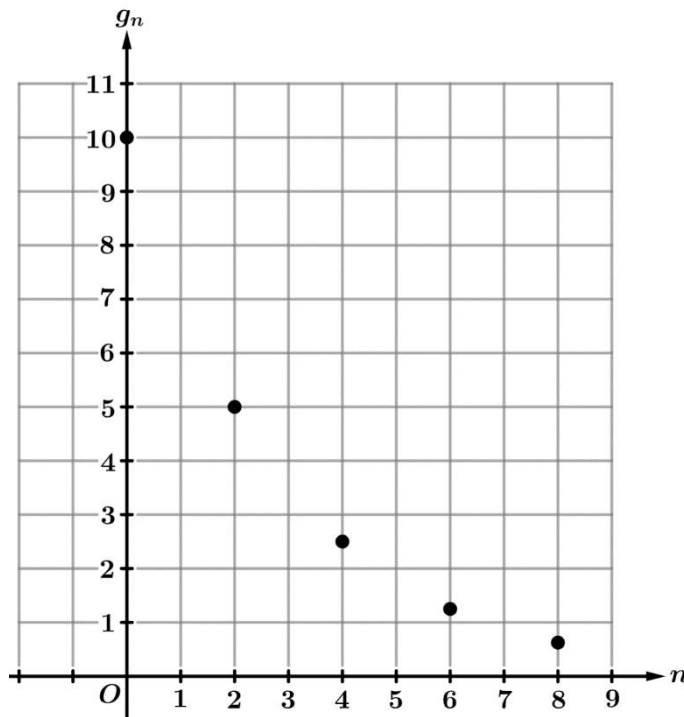
3. Values of the terms of a geometric sequence g_n are graphed in the figure. Which of the following is an expression for the n th term of the geometric sequence?

(A) $-4\left(\frac{1}{2}\right)^{n-1}$

(B) $4\left(-\frac{1}{2}\right)^{n-1}$

(C) $4\left(\frac{1}{2}\right)^{n-1}$

(D) $8\left(-\frac{1}{2}\right)^n$



4. Values of the terms of a geometric sequence g_n are graphed in the figure. Which of the following is an expression for the n th term of the geometric sequence?

(A) $5\left(\frac{1}{2}\right)^{n/2}$

(B) $5\left(\frac{1}{2}\right)^{n-2}$

(C) $10\left(\frac{1}{2}\right)^{n/2}$

(D) $10\left(\frac{1}{2}\right)^{2n}$

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5. A large theater has rows of seats arranged in a way that the number of seats in each consecutive row form an arithmetic sequence. If the fourth row contains 30 seats and the eighth row contains 54 seats, which of the following gives the number of seats in the tenth row?

- (A) 60 (B) 66 (C) 75 (D) 78

6. Let a_n represent an arithmetic sequence where $a_3 = 22$ and $a_6 = 10$. What is the value of a_{12} ?

- (A) -48 (B) -14 (C) -4 (D) -2

n	0	1	2	3	4
s_n	12	6	0	-6	-12

7. The table gives values of the sequence s_n at selected values of n . Which of the following statements about s_n is true?

- (A) s_n could be an arithmetic sequence, because successive terms have a constant difference.
(B) s_n could be an arithmetic sequence, because successive terms have constant proportional change.
(C) s_n could be a geometric sequence, because successive terms have a constant difference.
(D) s_n could be a geometric sequence, because successive terms have constant proportional change.

n	2	3	4	5	6
s_n	1	2	4	8	16

8. The table gives values of the sequence s_n at selected values of n . Which of the following statements about s_n is true?

- (A) s_n could be an arithmetic sequence, because successive terms have a constant difference.
(B) s_n could be an arithmetic sequence, because successive terms have constant proportional change.
(C) s_n could be a geometric sequence, because successive terms have a constant difference.
(D) s_n could be a geometric sequence, because successive terms have constant proportional change.

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Topic 2.3: Exponential Functions

13. The function f is given by $f(x) = 4\left(\frac{2}{3}\right)^x$. Which of the following describes the end behavior of f ?

- (A) $\lim_{x \rightarrow -\infty} f(x) = -\infty$ and $\lim_{x \rightarrow \infty} f(x) = \infty$
- (B) $\lim_{x \rightarrow -\infty} f(x) = \infty$ and $\lim_{x \rightarrow \infty} f(x) = -\infty$
- (C) $\lim_{x \rightarrow -\infty} f(x) = 0$ and $\lim_{x \rightarrow \infty} f(x) = \infty$
- (D) $\lim_{x \rightarrow -\infty} f(x) = \infty$ and $\lim_{x \rightarrow \infty} f(x) = 0$

14. The function g is given by $g(x) = 2(3)^x$. Which of the following describes the end behavior of g ?

- (A) $\lim_{x \rightarrow -\infty} g(x) = 0$ and $\lim_{x \rightarrow \infty} g(x) = -\infty$
- (B) $\lim_{x \rightarrow -\infty} g(x) = -\infty$ and $\lim_{x \rightarrow \infty} g(x) = 0$
- (C) $\lim_{x \rightarrow -\infty} g(x) = 0$ and $\lim_{x \rightarrow \infty} g(x) = \infty$
- (D) $\lim_{x \rightarrow -\infty} g(x) = \infty$ and $\lim_{x \rightarrow \infty} g(x) = 0$

15. The function h is given by $h(x) = \frac{2}{5}(4)^x$. Which of the following describes the end behavior of h ?

- (A) $\lim_{x \rightarrow -\infty} h(x) = 0$ and $\lim_{x \rightarrow \infty} h(x) = -\infty$
- (B) $\lim_{x \rightarrow -\infty} h(x) = -\infty$ and $\lim_{x \rightarrow \infty} h(x) = 0$
- (C) $\lim_{x \rightarrow -\infty} h(x) = 0$ and $\lim_{x \rightarrow \infty} h(x) = \infty$
- (D) $\lim_{x \rightarrow -\infty} h(x) = \infty$ and $\lim_{x \rightarrow \infty} h(x) = 0$

16. The function k is given by $k(x) = -3(5)^x$. Which of the following describes the end behavior of k ?

- (A) $\lim_{x \rightarrow -\infty} k(x) = 0$ and $\lim_{x \rightarrow \infty} k(x) = -\infty$
- (B) $\lim_{x \rightarrow -\infty} k(x) = -\infty$ and $\lim_{x \rightarrow \infty} k(x) = 0$
- (C) $\lim_{x \rightarrow -\infty} k(x) = 0$ and $\lim_{x \rightarrow \infty} k(x) = \infty$
- (D) $\lim_{x \rightarrow -\infty} k(x) = \infty$ and $\lim_{x \rightarrow \infty} k(x) = 0$

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x	1	2	3	4	5
$h(x)$	2	6	18	54	162

21. The exponential function h is defined by $h(x) = ab^x$, where a and b are positive constants. The table gives values of $h(x)$ at selected values of x . Which of the following statements is true?

- (A) h demonstrates exponential decay because $a > 0$ and $0 < b < 1$.
- (B) h demonstrates exponential decay because $a > 0$ and $b > 1$.
- (C) h demonstrates exponential growth because $a > 0$ and $0 < b < 1$.
- (D) h demonstrates exponential growth because $a > 0$ and $b > 1$.

x	1	2	3	4	5
$k(x)$	8	12	18	27	$\frac{81}{2}$

22. The exponential function k is defined by $k(x) = ab^x$, where a and b are positive constants. The table gives values of $k(x)$ at selected values of x . Which of the following statements is true?

- (A) k demonstrates exponential decay because $a > 0$ and $0 < b < 1$.
- (B) k demonstrates exponential decay because $a > 0$ and $b > 1$.
- (C) k demonstrates exponential growth because $a > 0$ and $0 < b < 1$.
- (D) k demonstrates exponential growth because $a > 0$ and $b > 1$.

x	0	1	2	3	4
$f(x)$	54	36	24	16	$\frac{32}{3}$

23. The exponential function f is defined by $f(x) = ab^x$, where a and b are positive constants. The table gives values of $f(x)$ at selected values of x . Which of the following statements is true?

- (A) f demonstrates exponential decay because $a > 0$ and $0 < b < 1$.
- (B) f demonstrates exponential decay because $a > 0$ and $b > 1$.
- (C) f demonstrates exponential growth because $a > 0$ and $0 < b < 1$.
- (D) f demonstrates exponential growth because $a > 0$ and $b > 1$.

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24. Which of the following statements is true about the exponential function f given by $f(x) = 4\left(\frac{1}{3}\right)^x$?

- (A) f is always increasing, and the graph of f is always concave up.
- (B) f is always increasing, and the graph of f is always concave down.
- (C) f is always decreasing, and the graph of f is always concave up.
- (D) f is always decreasing, and the graph of f is always concave down.

25. Which of the following statements is true about the exponential function g given by $g(x) = \frac{1}{2} \cdot 3^x$?

- (A) g is always increasing, and the graph of g is always concave up.
- (B) g is always increasing, and the graph of g is always concave down.
- (C) g is always decreasing, and the graph of g is always concave up.
- (D) g is always decreasing, and the graph of g is always concave down.

26. Which of the following statements is true about the exponential function h given by $h(x) = 3 \cdot 5^x$?

- (A) h is always increasing, and the graph of h is always concave up.
- (B) h is always increasing, and the graph of h is always concave down.
- (C) h is always decreasing, and the graph of h is always concave up.
- (D) h is always decreasing, and the graph of h is always concave down.

27. Which of the following statements is true about the exponential function k given by $k(x) = -4 \cdot 3^x$?

- (A) k is always increasing, and the graph of k is always concave up.
- (B) k is always increasing, and the graph of k is always concave down.
- (C) k is always decreasing, and the graph of k is always concave up.
- (D) k is always decreasing, and the graph of k is always concave down.

28. Which of the following statements is true about the exponential function j given by $j(x) = -6\left(\frac{2}{7}\right)^x$?

- (A) j is always increasing, and the graph of j is always concave up.
- (B) j is always increasing, and the graph of j is always concave down.
- (C) j is always decreasing, and the graph of j is always concave up.
- (D) j is always decreasing, and the graph of j is always concave down.

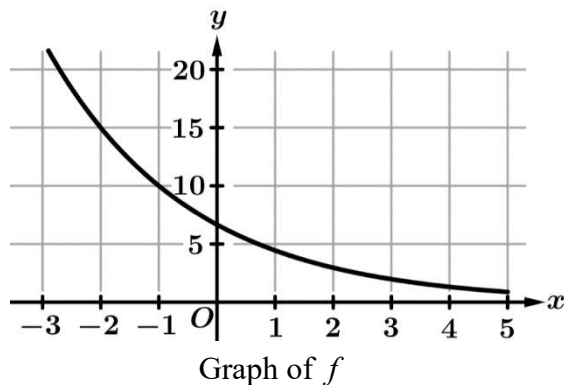
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35. The figure shows a portion of the graph of a function f . Which of the following conclusions is possible for f ?
- (A) f is quadratic because the output values are proportional over equal-length input-value intervals.
- (B) f is quadratic because the average rates of change over consecutive equal-length input-value intervals can be given by a linear function.
- (C) f is exponential because the output values are proportional over equal-length input-value intervals.
- (D) f is exponential because the average rates of change over consecutive equal-length input-value intervals can be given by a linear function.

Topic 2.4: Exponential Function Manipulation

36. The function f is given by $f(x) = 36 \cdot 4^x$. Which of the following is an equivalent form for $f(x)$?
- (A) $f(x) = 6 \cdot 2^{(x/2)}$
- (B) $f(x) = 6 \cdot 2^{(2x)}$
- (C) $f(x) = 36 \cdot 2^{(x/2)}$
- (D) $f(x) = 36 \cdot 2^{(2x)}$
37. The function j is given by $j(x) = 3 \cdot 4^{(x+2)}$. Which of the following is an equivalent form for $j(x)$?
- (A) $j(x) = 48^x$
- (B) $j(x) = 48 \cdot 4^x$
- (C) $j(x) = 3 \cdot 16^x$
- (D) $j(x) = 9 \cdot 16^x$

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42. In the xy -plane, the function h , given by $h(x) = 9 \cdot 3^x$, is a vertical dilation of the exponential function k , given by $k(x) = 3^x$. Which of the following is an equivalent form for $h(x)$ that expresses h as a horizontal translation of k ?
- (A) $h(x) = 3^{(2x)}$
 (B) $h(x) = 3^{(x+2)}$
 (C) $h(x) = 3^{(x-2)}$
 (D) $h(x) = 9 + 3^x$

43. The graph of a function f is a horizontal dilation of $y = 3^x$, and $f(x)$ is equivalent to $(\sqrt{3})^x$. Which of the following could be an expression for $f(x)$?
- (A) $3^{(x/2)}$ (B) $3^{(2x)}$ (C) $9^{(x/2)}$ (D) $9^{(2x)}$

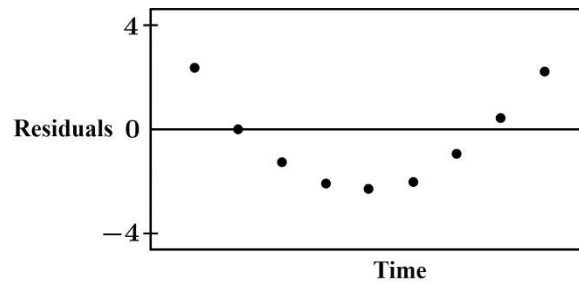
Topic 2.5: Exponential Function Context and Data Modeling

t	0	1	2	3	4
$C(t)$	10	30	90	270	810

44. The increasing function C gives the number of cars that are stuck in traffic due to lane closures. The table gives values of $C(t)$ for selected values of t , in minutes, since the beginning of the lane closures. If a model is constructed to represent these data, which of the following best applies to this situation?
- (A) $y = 30t + 10$ (B) $y = 300t + 10$ (C) $y = 10\left(\frac{1}{3}\right)^t$ (D) $y = 10(3)^t$
45. The number of cars that travel along a busy highway on a particular morning can be modeled by a function C . For $0 \leq t \leq 8$ hours, the total number of cars that have traveled on the highway at time t hours increases by 15% each hour. At time $t = 0$ hours, a total of 54 cars had traveled on the highway. If t is measured in minutes, which of the following is an expression for $C(t)$? (Note: There are 60 minutes in one hour).
- (A) $54(0.15)^{(t/60)}$ (B) $54(0.15)^{(60t)}$ (C) $54(1.15)^{(t/60)}$ (D) $54(1.15)^{(60t)}$

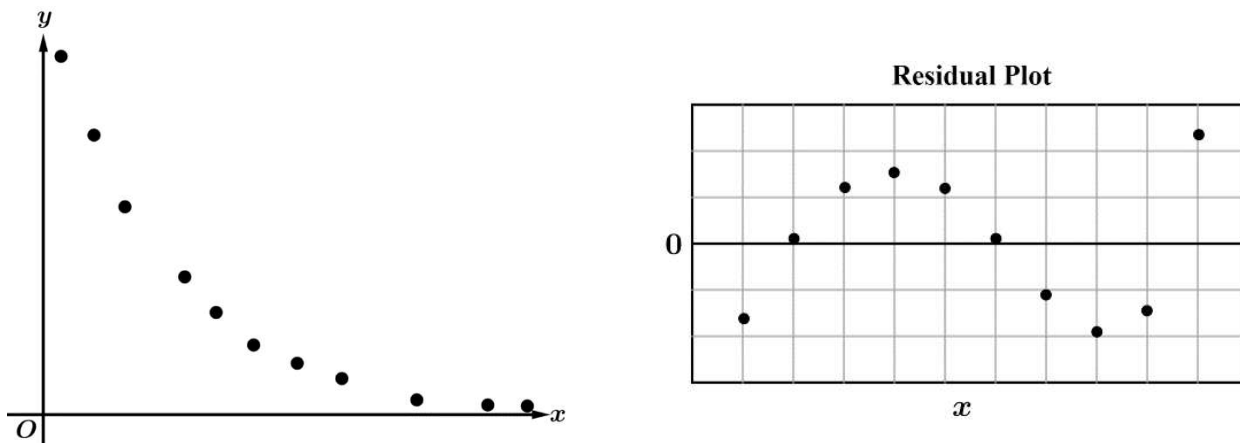
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Topic 2.6: Competing Function Model Validation



50. A linear regression was used to create a model for a set of data. The figure shows a graph of the residuals of the linear regression. Which of the following statements about the linear regression is true?

- (A) A linear regression model is appropriate, because the residuals show a clear pattern.
- (B) A linear regression model is appropriate, but a quadratic regression may be a better model.
- (C) A linear regression model is not appropriate, because the residuals do not show a linear pattern.
- (D) A linear regression model is not appropriate, because the residuals show a clear pattern.



51. A regression model was created for the data in the graph above (left). The residual plot for the model is given above (right). Which of the following statements about the regression model is best?

- (A) A quadratic regression model was used and the model is appropriate.
- (B) A quadratic regression model was used and the model is not appropriate.
- (C) An exponential regression model was used and the model is appropriate.
- (D) An exponential regression model was used and the model is not appropriate.

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Topic 2.7: Composition of Functions

Directions: Use the table below for problems 57 – 58.

x	2	3	5	9
$f(x)$	7	2	8	5
$g(x)$	3	5	4	2

The table gives values for the functions f and g at selected values of x . Functions f and g are defined for all real numbers.

57. Let h be the function defined by $h(x) = g(f(x))$. What is the value of $h(9)$?

- (A) 4 (B) 7 (C) 8 (D) 10

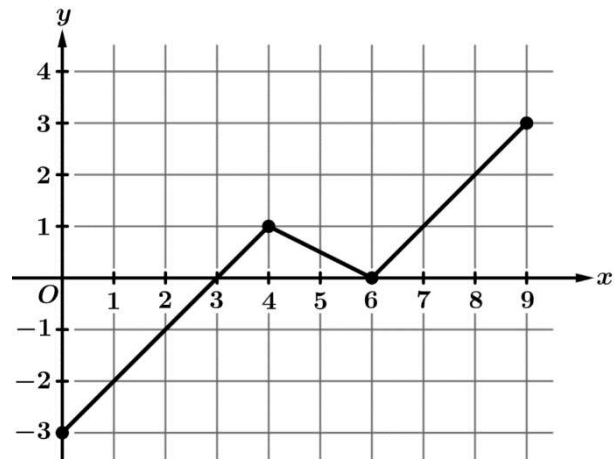
58. Let k be the function defined by $k(x) = f(g(x))$. What is the value of $k(3)$?

- (A) 3 (B) 7 (C) 8 (D) 10

Directions: Use the table below for problems 59 – 60.



Graph of f



Graph of g

The graphs of f and g are shown for $0 \leq x \leq 9$, each consisting of three line segments.

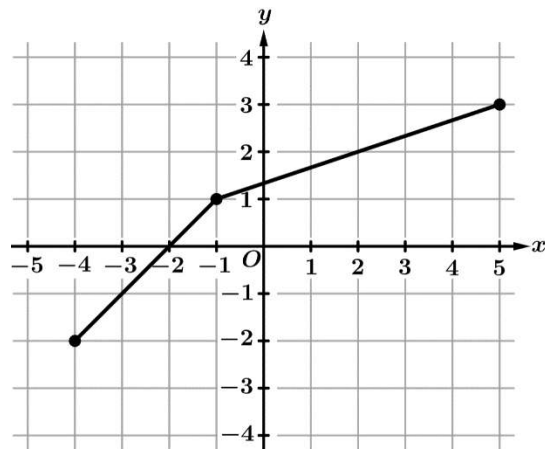
59. Let h be the function defined by $h(x) = g(f(x))$. What is the value of $h(8)$?

- (A) -2 (B) -1 (C) 0 (D) 2

60. Let k be the function defined by $k(x) = f(g(x))$. What is the value of $k(9)$?

- (A) -3 (B) -2 (C) 0 (D) 4

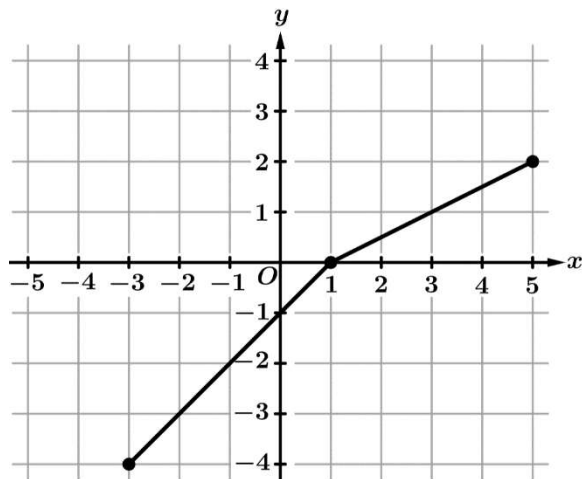
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Graph of f

65. The graph of the piecewise defined function f is shown above and consists of two line segments. The function g is the inverse of f , that is $g = f^{-1}$. What is the domain of g ?

- (A) $[-5, 4]$ (B) $[-4, 5]$ (C) $[-2, 3]$ (D) $\left[-\frac{1}{4}, \frac{1}{5}\right]$



Graph of h

66. The graph of the piecewise defined function h is shown above and consists of two line segments. The function k is the inverse of h , that is $k = h^{-1}$. What is the minimum value of k ?

- (A) -4 (B) -3 (C) $-\frac{1}{4}$ (D) $-\frac{1}{3}$

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x	-4	$\frac{1}{4}$	0	4	6
$f(x)$	-5	-2	1	3	4

67. The table gives values of the increasing function f for selected values of x . What is the value of $f^{-1}(4)$?
- (A) -5 (B) -2 (C) 3 (D) 6

Directions: Use the table below for questions 68 – 70.

x	1	2	4	7
$f(x)$	4	7	1	5
$g(x)$	3	4	7	2

The table gives values for the invertible functions f and g at selected values of x .

68. What is the value of $f^{-1}(g(4))$?

(A) 2 (B) 3 (C) 5 (D) 7

69. What is the value of $g^{-1}(f(2))$?

(A) 2 (B) 4 (C) 5 (D) 7

70. What is the value of $g^{-1}(f^{-1}(7))$?

(A) 1 (B) 4 (C) 5 (D) 7

71. What is the value of $f(g^{-1}(2))$?

(A) 1 (B) 2 (C) 4 (D) 5

72. The function h is increasing for all values of x , and the graph of h is concave up for all values of x . Let the function k be the inverse of h . Which of the following statements about k is true?

- (A) k is increasing, and the graph of k is concave up.
 (B) k is increasing, and the graph of k is concave down.
 (C) k is decreasing, and the graph of k is concave up.
 (D) k is decreasing, and the graph of k is concave down.

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77. The function f is given by $f(x) = \log_8 x$. What is the value of $f(2)$?

- (A) -3 (B) $\frac{1}{4}$ (C) $\frac{1}{3}$ (D) 3

78. The function g is given by $g(x) = \log_3 x$. What is the value of $g\left(\frac{1}{9}\right)$?

- (A) -2 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) 2

79. The function h is given by $h(x) = \log_4 x$. What input value in the domain of h yields an output value of $\frac{1}{2}$?

- (A) -2 (B) $-\frac{1}{2}$ (C) $\frac{1}{2}$ (D) 2

80. The function p is given by $p(x) = \log_{10} x$, and the function r is given by $r(x) = 1$. For which values of x will the graphs of p and r intersect?

- (A) 0 (B) $\frac{1}{10}$ (C) 1 (D) 10

Topic 2.10: Inverses of Exponential Functions

81. The function g is given by $g(x) = \log_4 x$. Which of the following statements about the inverse of g is true?

- (A) The inverse of g is given by $g^{-1}(x) = x^4$ and is defined for all real values of x .
(B) The inverse of g is given by $g^{-1}(x) = 4^x$ and is defined only for $x > 4$.
(C) The inverse of g is given by $g^{-1}(x) = 4^x$ and is defined for all real values of x .
(D) g does not have an inverse because the graph of g is undefined for $x \leq 0$.

82. The points $\left(-3, \frac{1}{8}\right)$ and $(4, 16)$ are on the graph of the exponential function h given by $h(x) = b^x$, where $b > 1$.

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85. The table shows values for a function k at selected values of x . Which of the following claim and explanation statements best fits these data?

- (A) k is best modeled by an exponential function, because the input values change proportionately as output values increase in equal-length intervals.
- (B) k is best modeled by an exponential function, because the output values change proportionately as input values increase in equal-length intervals.
- (C) k is best modeled by a logarithmic function, because the input values change proportionately as output values increase in equal-length intervals.
- (D) k is best modeled by a logarithmic function, because the output values change proportionately as input values increase in equal-length intervals.

x	10	20	30	40	50
$k(x)$	$\frac{2}{9}$	$\frac{2}{3}$	2	6	18

Topic 2.11: Logarithmic Functions

86. Let f be the logarithmic function given by $f(x) = 3 \log_{10} x$. Which of the following statements about f is true?

- (A) f is increasing, and the graph of f is concave up.
- (B) f is increasing, and the graph of f is concave down.
- (C) f is decreasing, and the graph of f is concave up.
- (D) f is decreasing, and the graph of f is concave down.

87. Let g be the logarithmic function given by $g(x) = -2 \log_3 x$. Which of the following statements about g is true?

- (A) g is increasing, and the graph of g is concave up.
- (B) g is increasing, and the graph of g is concave down.
- (C) g is decreasing, and the graph of g is concave up.
- (D) g is decreasing, and the graph of g is concave down.

88. Let h be the logarithmic function given by $h(x) = 3 - 2 \log_6 x$. Which of the following statements about h is true?

- (A) h is increasing, and the graph of h is concave up.
- (B) h is increasing, and the graph of h is concave down.
- (C) h is decreasing, and the graph of h is concave up.
- (D) h is decreasing, and the graph of h is concave down.

89. Let k be the logarithmic function given by $k(x) = \frac{1}{4} \log_{10} x$. Which of the following limit statements about the graph of k is true?

- (A) $\lim_{x \rightarrow \infty} k(x) = 0$ (B) $\lim_{x \rightarrow \infty} k(x) = \infty$ (C) $\lim_{x \rightarrow \infty} k(x) = -\infty$ (D) $\lim_{x \rightarrow 0^+} k(x) = \infty$

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96. Which of the following expressions is equivalent to $\log_2 \left(\frac{5y^2}{z^3} \right)$, where y and z are positive constants?

(A) $\log_2 5 + \log_2 (2y) - \log_2 (3z)$

(B) $5 + 2\log_2 y - 3\log_2 z$

(C) $\log_2 5 + 2\log_2 y - 3\log_2 z$

(D) $\frac{(\log_2 5) \cdot (2\log_2 y)}{3\log_2 z}$

97. Which of the following expressions is equivalent to $\ln \left(\frac{2e^4}{x^3} \right)$, where x is a positive constant?

(A) $4 + \ln 2 - 3 \ln x$

(B) $4 + \ln 2 + 3 \ln x$

(C) $4 \ln 2 - 3 \ln x$

(D) $\ln 2 + \ln 4 - 3 \ln x$

98. Which of the following is equivalent to $2 \log x - 3 \log y$, where x and y are positive constants?

(A) $\log(x^2 - y^3)$ (B) $\log(x^2 y^3)$ (C) $\log \left(\frac{x^2}{y^3} \right)$ (D) $\log \left(\frac{2x}{3y} \right)$

99. Which of the following expressions is equivalent to $\log_7 x$, where x is a positive constant?

(A) $7 \log x$ (B) $\frac{\log 7}{\log x}$ (C) $\frac{\log x}{\log 7}$ (D) $\log x - \log 7$

100. Which of the following expressions is equivalent to $\log_4 9$?

(A) $\ln 9 - \ln 4$ (B) $\frac{\log_9 10}{\log_4 10}$ (C) $\frac{\log_{10} 4}{\log_{10} 9}$ (D) $\frac{\ln 9}{\ln 4}$

101. Let $f(x) = \ln x$. Which of the following is equivalent to $2 \cdot f(w) - f(z)$, where w and z are positive constants?

(A) $\ln(w^2 \cdot z)$ (B) $\ln \left(\frac{w^2}{z} \right)$ (C) $\ln \left(\frac{2w}{z} \right)$ (D) $\ln(w^2 - z)$

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- (B) $\ln\left(\frac{w^2}{y \cdot z^3}\right)$
- (C) $\ln\left(\frac{w^2 \cdot z^3}{y}\right)$
- (D) $\ln(w^2 \cdot y \cdot z^3)$

Topic 2.13: Exponential and Logarithmic Equations and Inequalities

106. Consider the functions f and g given by $f(x) = \log_{10}(x+3) - \log_{10}(x)$ and $g(x) = 1$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of f and g ?

- (A) $-\frac{10}{3}$ (B) $\frac{1}{3}$ (C) 2 (D) 3

107. Consider the functions f and g given by $f(x) = \ln(2x+1)$ and $g(x) = 2 \ln 3$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of f and g ?

- (A) -5 (B) $\frac{5}{2}$ (C) $\frac{7}{2}$ (D) 4

108. Consider the functions f and g given by $f(x) = \log_2(3x-1) - \log_2(x+1)$ and $g(x) = \log_2(2)$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of f and g ?

- (A) -5 (B) 2 (C) 3 (D) there is no such value of x

109. Consider the functions f and g given by $f(x) = \log_3 x - \log_3 4$ and $g(x) = 2$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of f and g ?

- (A) $\frac{9}{4}$ (B) 8 (C) 32 (D) 36

110. Consider the functions f and g given by $f(x) = \log_{10}(x+3) + \log_{10}(x-5)$ and $g(x) = \log_{10}(3x-1)$. In the xy -plane, what are all x -coordinates of the points of intersection of the graphs of f and g ?

- (A) -2 and 7 (B) -2 only (C) 2 only (D) 7 only

111. Consider the functions f and g given by $f(x) = \ln(2x+3) + \ln(x-1)$ and $g(x) = \ln(x^2 + 6x - 9)$. In the xy -plane, what are all of the points of intersection of the graphs of f and g ?

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- (A) 2 only (B) 2 and -2 (C) 2 and $-\frac{1}{2}$ (D) 2 and 1

118. Consider the functions h and k given by $h(x) = 3^x$ and $k(x) = 9^{x-1}$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of h and k ?

- (A) -1 (B) 0 (C) 1 (D) 2

119. Consider the functions g and h given by $g(x) = 4^x$ and $h(x) = \left(\frac{1}{2}\right)^{x+3}$. In the xy -plane, what is the x -coordinate of the point of intersection of the graphs of g and h ?

- (A) -6 (B) -2 (C) -1 (D) 3

120. The function f is given by $f(x) = 3 + 2e^{-x}$. For which of the following values of x is $f(x) = 11$?

- (A) $x = 1 + \ln 4$ (B) $x = \frac{-\ln 8}{2}$ (C) $x = -\ln 4$ (D) $x = \frac{3 - \ln 11}{2}$

121. The function g is given by $g(x) = 3^{x+1}$. For which of the following values of x is $g(x) = 27$?

- (A) $x = -\frac{2}{3}$ (B) $x = 2$ (C) $x = 3$ (D) $x = 4$

122. The function h is given by $h(x) = 2^{3x-1}$. For which of the following values of x is $h(x) = \frac{1}{16}$?

- (A) $x = -4$ (B) $x = -1$ (C) $x = \frac{1}{4}$ (D) $x = \frac{5}{3}$

123. The function k is given by $k(x) = 3 \cdot 8^x$. For which of the following values of x is $k(x) = 12$?

- (A) $x = -\frac{2}{3}$ (B) $x = -6$ (C) $x = -\frac{1}{2}$ (D) $x = -\frac{2}{3}$