Indicate the answer choice that best completes the statement or answers the question.

1. One of the following functions is neither odd nor even. Which one?

a. $x^9 + 5x^5 + 10x$ b. $10x^4 - |x^4| + 5$ c. $x^4 + 5x + 5 + |x - 5|$ d. $x^5 + 5x$

2. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



3. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



4. Which statement is true for the graph of $f(x) = 2x^3 - 6x^2 - 48x + 24$?

- a. (4, -140) is a relative minimum; (-2, 77) is a relative maximum
- b. (4, -136) is a relative minimum; (-2, 80) is a relative maximum
- c. (-2, 80) is a relative minimum; (4, -136) is a relative maximum
- d. (-2, 77) is a relative minimum; (4, -140) is a relative maximum
- 5. Which statement best describes how a graph of y = 3|x| is related to the parent graph?
 - a. The graph is stretched vertically. b. The graph is stretched horizontally.
 - c. The graph is shrunk vertically. d. The graph is shrunk horizontally.

6. Which statement best describes how a graph of y = 3|x| is related to the parent graph?

- a. The graph is stretched vertically. b. The graph is stretched horizontally.
- c. The graph is shrunk vertically. d. The graph is shrunk horizontally.

7. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



8. Use the domain and range of each of the following relations to determine which is a function.

a. {(-4, 3), (-2, -1), (-4, 8)}
b. {(-4, 3), (-2, -1), (-7, 8)}
c. {-4, -2, -7, 7}
d. {(-4, 3), (-2, -1), (-2, -8), (-7, 8)}

9. Which of the following graphs is a function?



10. The graph below is a portion of a complete graph. Which graph below is the complete graph assuming it is an even function?



11. Find the lower quartile of the data shown on the box-and-whisker plot below.



12. In a race between 18 people, how many ways can the top 5 finishers be arranged?

a. 1,028,160 b. 8,568 c. 742,560 d. 73,440

Estimate and classify the critical points for the graph of each function.

13.



14. Find (f + g)(x) and (f - g)(x) for $f(x) = 2x^2 + 5$ and g(x) = 7 - 2x.

a.
$$(f + g)(x) = 2x^2 + 2x - 2$$

 $(f - g)(x) = 2x^2 - 2x + 12$
b. $(f + g)(x) = 2x^2 + 2x - 12$
 $(f - g)(x) = 2x^2 - 2x + 12$
c. $(f + g)(x) = 2x^2 + 3x + 7$
 $(f - g)(x) = 2x^2 - 2x + 12$
 $(f - g)(x) = 2x^2 - 2x + 12$
 $(f - g)(x) = 2x^2 + 2x - 2$

15. Use the graph of f(x) to estimate f(-1).



a. f(-1) = -3 b. f(-1) = -4c. f(-1) = -2 d. f(-1) = 3

16. A corporate jet originally cost \$17,550,000. If its value depreciates by 5 percent per year, what will its value be after 10 years?

a. \$10,507,833.28b. \$7,042,166.72c. \$8,775,000d. \$10,774,177.60

17. Use $A = \begin{bmatrix} 3 & 6 \\ -2 & 2 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 9 \\ 7 & -5 \end{bmatrix}$ to determine whether 3(A + B) = 3A + 3B for the given matrices. a. Yes b. No

18. Solve.

 $\frac{x+3}{x-5} = \frac{x+7}{x-9}$ a. 1 b. 8 c. -5 d. 2

19. As automobiles age, the average miles traveled per gallon decreases. Determine the regression equation that best models the data.

Age (years)	MPG
1	35
3	34
5	33
7	31
9	28
11	26
13	23
15	18
a. power	b. logarithmic
c. quadratic	d. exponential

20. Find the exact solution of $x^2 - 5x = 36$ by using the Quadratic Formula.

a. -8, 18 b. -9, 4

- c. 36, 41 d. –4, 9
- 21. Use the graph below to identify the *y*-intercept and zeros.



22. Use the graph of f(x) to estimate f(3).





23. Graph the function defined by f(x) = |x+3|.



24. Solve $\log_{6} x = 2$ a. 36 b. 12 c. 6 d. 64 25. $\frac{2y+1}{5} - \frac{2+7y}{15} > \frac{2}{3}$ a. y > -9 b. y < -9c. y > 0 d. y > 0 or y < -9

Estimate and classify the critical points for the graph of each function.

26.



a. (-2, 0), minimum; (0, 8), maximum; (4, 0), minimum
b. (-2, 0), minimum; (0, 8), point of inflection; (1, 9), maximum; (4, 0), minimum
c. (1, 9), point of inflection
d. (1, 9), maximum

27. Use the end behavior of the graph to solve $-2x^3 - 11x^2 + 6x > 0$.

a.
$$\left(0, \frac{1}{2}\right)$$

b. $\left(-6, 0\right)$
c. $\left(-6, 0\right)$ or $\left(\frac{1}{2}, \infty\right)$
d. $\left(-\infty, -6\right)$ or $\left(0, \frac{1}{2}\right)$

28. State the domain of $f \circ g$. Then find $f \circ g$, including any additional restrictions necessary on the domain of the composition.

$$f(x) = \frac{-9}{x}$$
$$g(x) = \sqrt{x-1}$$

a. D:
$$x > 1$$
; $(f \circ g)(x) = \frac{-9}{\sqrt{x-1}}$
b. D: $x \ge 1$; $(f \circ g)(x) = \frac{-9}{\sqrt{x-1}}$
c. D: $x \ne 0$; $(f \circ g)(x) = \sqrt{\frac{-9}{x} - 1}$
d. D: $x \ne 0$; $(f \circ g)(x) = \frac{-9}{\sqrt{x-1}}$

29. Find the amount of time required to double an amount at 5.84% if the interest is compounded continuously.

a. 5.15 years	b. 5.94 years
c. 11.87 years	d. 23.74 years

30. Describe the end behavior of the graph.



a. $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$ and $f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$ b. $f(x) \rightarrow -\infty$ as $x \rightarrow -\infty$ and $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ c. $f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$ and $f(x) \rightarrow -\infty$ as $x \rightarrow +\infty$ d. $f(x) \rightarrow +\infty$ as $x \rightarrow -\infty$ and $f(x) \rightarrow +\infty$ as $x \rightarrow +\infty$ ____

31. If
$$A = \begin{bmatrix} -11 & 4 & -5 \\ 2 & 1 & 7 \end{bmatrix}$$
, find -6A.
a. $\begin{bmatrix} -66 & 24 & -30 \\ 12 & 6 & 42 \end{bmatrix}$
b. $\begin{bmatrix} -66 & -24 & -30 \\ -12 & -6 & -42 \end{bmatrix}$
c. $\begin{bmatrix} 66 & -24 & 30 \\ 2 & 1 & 7 \end{bmatrix}$
d. $\begin{bmatrix} 66 & -24 & 30 \\ -12 & -6 & -42 \end{bmatrix}$

32. Use the graph of f(x) to estimate f(1).



a. f(1) = 3b. f(1) = 2c. f(1) = -2d. f(1) = 1



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34. Solve the equation
$$x^2 - 13x + 40 = 0$$
.

a. -5, -8 b. -5, 8 c. 5, -8 d. 5, 8

Estimate and classify the critical points for the graph of each function.

35.



b. (-4, -4.5), minimum; (0, 4), point of inflection; (4, -4.5), minimum

c. (-4, -4.5), minimum; (-2, 0), point of inflection; (0, 4), maximum; (2, 0), point of inflection; (4, -4.5), minimum

d. no critical points

Without graphing, describe the end behavior of the graph of the function.

36. $f(x) = 6x^6 + 4x^2$ a. As $x \to \infty$, $f(x) \to \infty$. b. As $x \to \infty$, $f(x) \to \infty$. c. As $x \to \infty$, $f(x) \to -\infty$. b. As $x \to \infty$, $f(x) \to \infty$. c. As $x \to \infty$, $f(x) \to -\infty$. As $x \to -\infty$, $f(x) \to -\infty$. As $x \to -\infty$, $f(x) \to -\infty$.

37. Use the graph below to find the domain and range.



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38. Solve the system of inequalities by graphing.



Evaluate each expression.

39. 6^{log₆1.5} a. 6 b. 6¹⁵

c. 1.5⁶ d. 1.5

40. Use the graph below to find the domain and range.



41. Use the graph below to identify the *y*-intercept and zeros.



Estimate and classify the critical points for the graph of each function.



43. Determine whether the graph of 5xy = 9 is odd or even.

a.	neither	b. odd
c.	even	d. both

44. State whether the graph of $f(x) = \frac{x^3 + 7x^2 + 10x}{x + 5}$ has infinite discontinuity, jump discontinuity, point discontinuity, or is continuous.

- a. The function has jump discontinuity. b. The function has infinite discontinuity.
- c. The function is continuous. d. The function has point discontinuity.

45. Graph
$$f(x) = 2\sqrt{x+5}$$
.



46. Simplify the expression $\frac{8-8i\sqrt{5}}{6+2i\sqrt{5}}$ by using complex conjugates to write quotients of complex numbers in standard

form

a.
$$-\frac{4}{7} - \frac{56}{23}i\sqrt{5}$$
 b. $\frac{16}{23} + \frac{56}{23}i\sqrt{5}$
c. $-\frac{4}{7} - \frac{8}{7}i\sqrt{5}$ d. $\frac{16}{23} + \frac{8}{7}i\sqrt{5}$

47. Find the standard deviation for the given data.

5, 6, 8, 12, 10

- a. 3.56 b. 4.56 c. 2.56 d. 1.56
- 48. Graph the function $f(x) = \left(\frac{1}{3}\right)^x$.



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49. Use the graph of f(x) to estimate f(-1).



a. $f(-1) = 7$	(-1) = -6
c. $f(-1) = -7$	d. $f(-1) = -6$

50. A housing developer uses the number of new residents in a community to decide when to plan a new construction project. The following table shows the county registrar's records of new residents over a period of five years.

Year	2006	2007	2008	2009	2010
New Residents	127	147	173	196	232

1. Find an exponential function to model the data as a function of x years since 2006.

2. Write the equation from part a in terms of base *e*.

3. Estimate when the number of new residents will exceed 400 per year.

127 × (1.116) ^x	0. 1. $y = 127 \times (1.016)^{x}$
127e ^{0.1098x}	2. $y = 127e^{0.0159x}$
16	3. 2013
$127 \times (1.161)^{x}$	d. 1. $y = 127 \times (1.111)^x$
127e ^{0.1493x}	2. $y = 127e^{0.1053x}$
14	3. 2017
	$127 \times (1.116)^{x}$ $127e^{0.1098x}$ 16 $127 \times (1.161)^{x}$ $127e^{0.1493x}$ 14

Answer Key

1. c			
2. b			
3. b			
4. b			
5. a			
6. a			
7. c			
8. b			
9. d			
10. d			
11. c			
12. a			
13. c			
14. d			
15. a			
16. a			
17. a			
18. a			
19. d			
20. d			
21. a			
22. b			
23. c			

- 24. a
- 25. b

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26. d		
27. d		
28. a		
29. c		
30. b		
31. d		
32. b		
33. c		
34. d		
35. a		
36. b		
37. а		
38. a		
39. d		
40. a		
41. b		
42. b		
43. b		
44. d		
45. c		
46. c		
47. c		
48. c		
49. c		
50. c		