MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

Give the domain and range of the relation.
1) \{(1, -8), (-7, 8), (-3, 7), (-3, -5)\}
   - A) domain = \{7, 8, -8, -5\}; range = \{-3, -7, 1\}
   - B) domain = \{-3, -7, 1, 3\}; range = \{7, 8, -8, -5\}
   - C) domain = \{-3, -7, 1\}; range = \{7, 8, -8, -5\}
   - D) domain = \{-3, -7, 1, -13\}; range = \{7, 8, -8, -5\}

Determine whether the relation is a function.
2) \{(1, -5), (3, 9), (4, 5), (7, 8), (12, -8)\}
   - A) Function
   - B) Not a function

Evaluate the function at the given value of the independent variable and simplify.
3) \(h(x) = |x - 12|\); \(h(17)\)
   - A) -5
   - B) 5
   - C) 29
   - D) -29

Use the vertical line test to determine whether or not the graph is a graph in which \(y\) is a function of \(x\).
4) A) function
   - B) not a function

Evaluate the piecewise function at the given value of the independent variable.
5) \(f(x) = \begin{cases} 
5x + 4 & \text{if } x < -3 \\
2x + 3 & \text{if } x \geq -3 
\end{cases}\)
   - Determine \(f(-7)\).
   - A) 35
   - B) 42
   - C) 39
   - D) -10
Use the graph to determine the function's domain and range.

6) 

A) domain: \((-\infty, \infty)\) 
   range: \((-\infty, \infty)\)
B) domain: \((-\infty, \infty)\) 
   range: \([-4, \infty)\)
C) domain: \((-\infty, -5)\) or \((-5, \infty)\) 
   range: \((-\infty, -4)\) or \((-4, \infty)\)
D) domain: \([-5, \infty)\) 
   range: \([-4, \infty)\)

Use the shape of the graph to name the function.

7) 

A) Standard cubic function
B) Absolute value function
C) Constant function
D) Identity function
Begin by graphing the standard absolute value function \( f(x) = |x| \). Then use transformations of this graph to graph the given function.

8) \( g(x) = |x| + 3 \)
Begin by graphing the standard quadratic function \( f(x) = x^2 \). Then use transformations of this graph to graph the given function.

9) \( h(x) = -(x + 2)^2 + 4 \)
Identify the intervals where the function is changing as requested.

10) Constant

[Graph of a horizontal line]

A) (3, ∞)  B) (-∞, 0)
C) (-1, 0)  D) (-∞, -1) or (3, ∞)

Determine whether the given function is even, odd, or neither.

11) \( f(x) = 2x^2 + x^4 \)

A) Neither  B) Even  C) Odd

Given functions \( f \) and \( g \), perform the indicated operations.

12) \( f(x) = 6 - 8x, \quad g(x) = -4x + 8 \)

Find \( f + g \).

A) -4x + 6  B) 2x  C) -4x + 14  D) -12x + 14

For the given functions \( f \) and \( g \), find the indicated composition.

13) \( f(x) = 7x + 9, \quad g(x) = 2x - 1 \)

\( (f \circ g)(x) \)

A) 14x + 2  B) 14x + 17  C) 14x + 8  D) 14x + 16

Given functions \( f \) and \( g \), perform the indicated operations.

14) \( f(x) = 4x - 9, \quad g(x) = 7x - 3 \)

Find \( f - g \).

A) -3x - 12  B) 3x + 6  C) 11x - 12  D) -3x - 6
Use the vertex and intercepts to sketch the graph of the quadratic function.

15) \( f(x) = -x^2 - 4x + 5 \)

Determine whether the given quadratic function has a minimum value or maximum value. Then find the coordinates of the minimum or maximum point.

16) \( f(x) = 2x^2 - 4x \)

A) minimum; \((1, -2)\)  
B) maximum; \((-1, -2)\)  
C) minimum; \((-1, -2)\)  
D) maximum; \((1, -2)\)
Find the x-intercepts of the polynomial function. State whether the graph crosses the x-axis, or touches the x-axis and turns around, at each intercept.

17) \( f(x) = -x^2(x + 5)(x^2 - 1) \)
   
   A) 0, touches the x-axis and turns around; B) 0, crosses the x-axis;  
   -5, crosses the x-axis; -1, crosses the x-axis;  
   1, crosses the x-axis  
   C) 0, touches the x-axis and turns around; D) 0, touches the x-axis and turns around  
   5, crosses the x-axis; -1, touches the x-axis and turns around;  
   1, touches the x-axis and turns around  

Find the zeros for the polynomial function and give the multiplicity for each zero. State whether the graph crosses the x-axis or touches the x-axis and turns around, at each zero.

18) \( f(x) = 3(x - 3)(x - 6)^3 \)
   
   A) -3, multiplicity 1, touches x-axis; -6, multiplicity 3, touches x-axis and turns around  
   B) -3, multiplicity 1, crosses x-axis; -6, multiplicity 3, crosses x-axis  
   C) 3, multiplicity 1, crosses x-axis; 6, multiplicity 3, touches x-axis and turns around  
   D) 3, multiplicity 1, crosses x-axis; 6, multiplicity 3, crosses x-axis  

Determine the maximum possible number of turning points for the graph of the function.

19) \( f(x) = (x + 3)(x + 4)(4x - 3) \)
   
   A) 3  B) 4  C) 2  D) 0  

Graph the polynomial function.

20) \( f(x) = 3x^2 - x^3 \)