Assignment 1

Due on 2023-04-03 23:59:59

1. Which of the following are correct statements about functions of one variable?
   - a. Every function has a domain.
   - b. A constant function is a special case of a linear function.
   - c. The range of a function is the set of all possible values of the dependent variable.
   - d. A function cannot have more than one output for a given input.
   - e. A function is a relation where each input corresponds to exactly one output.

2. If \( f(x) = 2x + 3 \), find \( f(4) \).
   - a. 11
   - b. 10
   - c. 9
   - d. 8

3. Which of the following are linear functions?
   - a. \( f(x) = x^2 + 1 \)
   - b. \( f(x) = 3x - 2 \)
   - c. \( f(x) = \sqrt{x} \)
   - d. \( f(x) = \frac{1}{x} \)

4. Evaluate \( g(x) = \frac{2}{x} \) for \( x = 4 \).
   - a. 0.5
   - b. 2
   - c. 1
   - d. 4

5. Which of the following are quadratic functions?
   - a. \( f(x) = x^3 - 2x + 1 \)
   - b. \( f(x) = x^2 + 4x - 7 \)
   - c. \( f(x) = 2x - 3 \)
   - d. \( f(x) = \frac{1}{x^2} \)

6. For a quadratic function \( f(x) = ax^2 + bx + c \), the vertex is given by \( -\frac{b}{2a} \). Which of the following is correct?
   - a. The vertex is always the highest point on the graph.
   - b. The vertex is always the lowest point on the graph.
   - c. The vertex is the point where the function changes direction.
   - d. The vertex is the point where the function is undefined.

7. Which of the following are correct statements about parabolas?
   - a. A parabola opens upward if \( a > 0 \).
   - b. A parabola opens downward if \( a < 0 \).
   - c. A parabola opens to the right if \( b > 0 \).
   - d. A parabola opens to the left if \( b < 0 \).

8. Which of the following are correct statements about circles?
   - a. The center of a circle is the point equidistant from all points on the circle.
   - b. The radius of a circle is the distance from the center to any point on the circle.
   - c. The circumference of a circle is given by \( C = \pi d \).
   - d. The area of a circle is given by \( A = \pi r^2 \).

9. Which of the following are correct statements about ellipses?
   - a. An ellipse is a closed curve.
   - b. A circle is a special case of an ellipse.
   - c. The sum of the distances from any point on an ellipse to the foci is constant.
   - d. The eccentricity of an ellipse is always equal to 1.

10. Which of the following are correct statements about hyperbolas?
    - a. A hyperbola is a open curve.
    - b. A circle is a special case of a hyperbola.
    - c. The difference of the distances from any point on a hyperbola to the foci is constant.
    - d. The eccentricity of a hyperbola is always greater than 1.

11. Which of the following are correct statements about transformations of functions?
    - a. A vertical stretch of a function is given by \( f(x) = af(x) \), where \( a > 1 \).
    - b. A horizontal stretch of a function is given by \( f(x) = f(bx) \), where \( b > 1 \).
    - c. A vertical compression of a function is given by \( f(x) = af(x) \), where \( 0 < a < 1 \).
    - d. A horizontal compression of a function is given by \( f(x) = f(bx) \), where \( b < 1 \).

12. Which of the following are correct statements about limits?
    - a. The limit of a function as \( x \) approaches \( a \) is the value that \( f(x) \) approaches as \( x \) gets close to \( a \).
    - b. A limit does not exist if the left-hand limit and the right-hand limit are different.
    - c. The limit of a function as \( x \) approaches \( a \) is the value of the function at \( x = a \).
    - d. Limits are only concerned with the behavior of the function at \( x = a \) and not for \( x \) values close to \( a \).