Find the domain of the following functions:

1. \( f(x) = \sqrt{19 - x} \)
   a. \((-\infty, 19]\)  
   b. \([\sqrt{19}, \infty)\)  
   c. \((-\infty, 19] \cup [19, \infty)\)  
   d. All real numbers

2. \( f(x) = \frac{\sqrt{x+5}}{(x+8)(x-9)} \)
   a. \((-\infty, -8) \cup (-8, -5) \cup (-5, 9) \cup (9, \infty)\)  
   b. \([-5, 9) \cup (9, \infty)\)  
   c. \((0, \infty)\)  
   d. All real numbers

3. \( f(x) = \frac{x}{x-7} \)
   a. All real numbers  
   b. \(\{x|x \neq 7\}\)  
   c. \(\{x|x \neq -7\}\)  
   d. \(\{x|x \neq 7\}\)

4. \( f(x) = \ln(-6 - x) \)
   a. \((-6, \infty)\)  
   b. \((6, \infty)\)
   c. \((-\infty, -6)\)  
   d. \((-\infty, 6)\)

5. Find the domain and the range for the following function

   ![Graph](image)

   a. D: \([-10, \infty)\), R: \((-\infty, \infty)\)  
   b. D: \([2, 8]\), R: \([-10, 0]\)  
   c. D: \((-\infty, 2) \cup (8, \infty)\), R: \((2, 8)\)  
   d. D: \((-\infty, \infty)\), R: \([-10, \infty)\)

6. Find an equation of variation for the given situation: \(y\) varies jointly as \(x\) and the square of \(z\) and inversely as \(w\), and \(y = \frac{27}{2}\) when \(x = 2\), \(z = 3\), and \(w = 8\).

   a. \(y = \frac{18xz^2}{w}\)  
   b. \(y = \frac{6xz^2}{w}\)  
   c. \(y = \frac{6xz}{w}\)  
   d. \(y = \frac{18xz}{w}\)

Solve the following exponential and logarithmic applications:

7. Let \(Q\) represent a mass of plutonium 241 \(^{241}\text{Pu}\) (in grams), whose half-life is 14.4 years. The quantity of plutonium 241 present after \(t\) years is given by \(Q = 100 \left(\frac{1}{2}\right)^{t/14.4}\). Determine the quantity present after 10 years.

   a. 0.0068 g  
   b. 61.79 g  
   c. 47.84 g  
   d. -23.18 g
8. You deposit $7550 in an account that pays 7.25% interest, compounded continuously. How long to the
nearest year will it take for the money to triple?
   a. 3 years  
   b. 28 years  
   c. 15 years  
   d. 41 years

9. The antler spread $a$ (in inches) and shoulder height $h$ (in inches) of an adult male American elk are
related by the model $h = 116 \log(a + 40) - 176$. Approximate the shoulder height of a male
American elk with an antler spread of 55 inches.
   a. 53.4 inches  
   b. 58 inches  
   c. 1.54 inches  
   d. 405.4 inches

10. The speed of the wind $S$ (in miles per hour) near the center of a tornado and the distance $d$ (in miles)
the tornado travels are related by the model $S = 93 \log d + 65$. On March 18, 1925, a large tornado
struck portions of Missouri, Illinois, and Indiana with a wind speed at the center of about 283 miles per
hour. Approximate the distance traveled by this tornado.
   a. 293 miles  
   b. 220.8 miles  
   c. 61.8 miles  
   d. 236.4 miles

Evaluate the following functions as indicated:

11. Find $f(k - 1)$ when $f(x) = 5x^2 + 4x - 5$.
   a. $-6k^2 + 5k - 4$  
   b. $5k^2 - 6k + 4$  
   c. $5k^2 - 6k - 4$  
   d. $5k^2 - 21k + 4$

12. Find $g(-6)$ when $g(x) = \frac{x+3}{x-1}$
   a. $\frac{3}{5}$  
   b. $\frac{-3}{7}$  
   c. $\frac{9}{7}$  

Find an equation of the line satisfying the following conditions:

13. Point: (3,2); $m = -\frac{5}{6}$
   a. $y = -\frac{5}{6}x + \frac{9}{2}$  
   b. $y = -\frac{5}{6}x - \frac{9}{2}$  
   c. $y = -\frac{6}{5}x + \frac{9}{2}$  
   d. $y = -\frac{6}{5}x + \frac{2}{9}$

14. y-intercept: (0,−18); $m = 4.7$
   a. $y = -18x + 4.7$  
   b. $y = 4.7x - 18$  
   c. $y = 18x - 4.7$  
   d. $y = -4.7x - 18$

15. Through Point: (1, −5), & perpendicular to $7x + 8y = 47$
   a. $y = -\frac{8}{7}x - \frac{27}{7}$  
   b. $y = -\frac{7}{8}x - \frac{33}{8}$  
   c. $y = \frac{7}{8}x - \frac{47}{8}$  
   d. $y = \frac{8}{7}x - \frac{43}{7}$
Match the functions or equations to their graphs:

16. \( f(x) = -3x - 5 \)
   a.
   ![Graph A]
   b.
   ![Graph B]
   c.
   ![Graph C]
   d.
   ![Graph D]

17. \( g(x) = (x - 4)^2 - 6 \)
   a.
   ![Graph E]
   b.
   ![Graph F]
   c.
   ![Graph G]
   d.
   ![Graph H]
18. \( h(x) = 2x(x + 1)(x + 2) \)

   a. 
   
   b. 

   c. 

   d. 

19. \( p(x) = 3^x \)

   a. 

   b. 

   c. 

   d.
20. \((x + 4)^2 + (y + 3)^2 = 16\)

\[\text{a.} \quad \text{Diagram Image}\]

\[\text{b.} \quad \text{Diagram Image}\]

\[\text{c.} \quad \text{Diagram Image}\]

\[\text{d.} \quad \text{Diagram Image}\]

21. \(G(x) = (x + 1)(x - 2)^2\)

\[\text{a.} \quad \text{Diagram Image}\]

\[\text{b.} \quad \text{Diagram Image}\]

\[\text{c.} \quad \text{Diagram Image}\]

\[\text{d.} \quad \text{Diagram Image}\]

**Solve the following equations:**

22. \(|7m + 4| + 9 = 15\)

\[\text{a.} \quad \frac{2}{7}, \quad -\frac{10}{7}\]

\[\text{b.} \quad -\frac{2}{7}, \quad \frac{10}{7}\]

\[\text{c.} \quad \frac{2}{7}\]

\[\text{d.} \quad \text{No solution}\]
23. \( \sqrt{4x - 3} = 2x - 3 \)
   a. 1, 3  
   b. 3  
   c. -3  
   d. No solution

24. \( 2x^2 + 6x = -3 \)
   a. \( \frac{-3 \pm \sqrt{15}}{2} \)  
   b. \( \frac{-3 \pm \sqrt{15}}{4} \)  
   c. \( \frac{-3 \pm \sqrt{15}}{2} \)  
   d. \( \frac{-6 \pm \sqrt{15}}{2} \)

25. \( \frac{x}{2x+2} = \frac{-2x}{4x+4} + \frac{2x-3}{x+1} \)
   a. \( x = \frac{3}{2} \)  
   b. \( x = 3 \)  
   c. \( x = -\frac{12}{5} \)  
   d. \( x = -3 \)

26. \( 2^{12-2x} = 16 \)
   a. \( x = 2 \)  
   b. \( x = 10 \)  
   c. \( x = -6 + \frac{\log 16}{\log 2} \)  
   d. \( x = 4 \)

27. \( \left( \frac{1}{3} \right)^x = 18 \)
   a. \( x = \ln \frac{1}{6} \)  
   b. \( x = \ln 6 \)  
   c. \( x = \frac{\ln 18}{\ln 3} \)  
   d. \( x = -\frac{\ln 18}{\ln 3} \)

28. \( \ln 2x + \ln 9x = \ln 19 \)
   a. \( x = 1 \)  
   b. \( x = 0 \)  
   c. \( x = \left( \frac{19}{18} \right)^{1/2} \)  
   d. \( x = \frac{e^{19}}{18} \)

29. Write the quadratic function in standard form, \( f(x) = a(x - h)^2 + k \). Identify the vertex:
   \( f(x) = x^2 + 5x + 2 \)
   a. \( f(x) = (x + 5)^2 - 23; (5, 23) \)  
   b. \( f(x) = (x + 5)^2 - 23; (-5, 23) \)  
   c. \( f(x) = \left( x + \frac{5}{2} \right)^2 - \frac{17}{4}; \left( -\frac{5}{2}, -\frac{17}{4} \right) \)  
   d. \( f(x) = \left( x + \frac{5}{2} \right)^2 - \frac{17}{4}; \left( \frac{5}{2}, -\frac{17}{4} \right) \)

30. How can the graph of \( f(x) = (x - 2)^2 - 5 \) be obtained from the graph of \( y = x^2 \)?
   a. Shift the graph 2 units left and 5 units down.  
   b. Shift the graph 5 units right and 2 units down.  
   c. Shift the graph 2 units left and 5 units up.  
   d. Shift the graph 2 units right and 5 units down.

31. Write a quadratic function that has \( x \)-intercepts, \( (-4, 0) \) & \( (2, 0) \) and opens downward.
   a. \( f(x) = -(x - 4)(x + 2) \)  
   b. \( f(x) = (x + 4)(x - 2) \)  
   c. \( f(x) = -(x + 4)(x - 2) \)  
   d. \( f(x) = (x - 4)(x + 2) \)

32. Graph the quadratic function, \( f(x) = 2x^2 - 7x + 5 \) and determine the interval(s) for which \( f(x) \geq 0 \).
   a. \( (-\infty, 1] \cup \left[ \frac{5}{2}, \infty \right) \)  
   b. \( (1, \frac{5}{2}) \)  
   c. \( (-\infty, 1) \cup \left( \frac{5}{2}, \infty \right) \)  
   d. \( [1, \frac{5}{2}] \)
33. Identify the equation which matches the following graph.

![Graph Image]

a. \( y = 2x - 1 \)  

b. \( x^2 + y^2 = 1 \)  

c. \( y = -2x - 1 \)  

d. \( y = x^2 - 1 \)  

34. Solve the following inequality and write solution in interval notation: \( x^2 + 9x + 14 \geq 0 \)

a. \((-\infty, -7] \cup [-2, \infty)\)  

b. \((-\infty, -7]\)  

c. \([-2, \infty)\)  

d. \([-7, -2]\)  

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

35. 

![Graph Image]

a. Even  

b. Odd  

c. Neither  

36. If a function \( f \) is even, then for every point \((x, y)\) on the graph of \( f \) there exists another point on the graph in the form:

a. \((-x, -y)\)  

b. \((x, -y)\)  

c. \((-x, y)\)  

37. Which of the following equations is not a function of \( y \) with respect to \( x \)?

a. \( 2x + 3y = 6 \)  

b. \( x^2 - y = 6x - 5 \)  

c. \( x^2 + y^2 = 16 \)  

d. \( y = 4x^3 - 5x^2 + 3x - 7 \)  

38. Find the inverse function for the following function: \( f(x) = \frac{x}{x+1} \)

a. \( f^{-1}(x) = \frac{x}{x-1} \)  

b. \( f^{-1}(x) = xy + x \)  

c. \( f^{-1}(x) = -x - 1 \)  

d. \( f^{-1}(x) = -\frac{x}{x-1} \)  

39. What principal should be deposited at 8.375% compounded monthly to ensure the account will be worth $20,000 in 10 years?

a. $10,884.35  

b. $8,681.04  

c. $5,141.21  

d. $6,097.12
40. Find the point(s) of intersection for the following system of equations: \( \begin{cases} y - 2x = 5 \\ x^2 + y^2 = 85 \end{cases} \)
   a. \((-6, -7) & (2, 9)\)  
   b. \((6, -7) & (-2, 9)\)  
   c. No Solution  
   d. \((3.1, 11.2) & (-7.1, -9.2)\)

41. If the function, \( y = R \cdot 2^t \), is used to model the growth in revenue of a business, then \( y \) represents:
   a. The initial amount of revenue.  
   b. The time in years  
   c. The amount of revenue after \( t \) years.  
   d. None of the above

**Predict the end behavior of the graph of \( f : \)**

42. \( f(x) = 4x - \frac{1}{3}x^3 \)
   a. Up on both sides  
   b. Down on both sides  
   c. Down left & up right  
   d. Up left & down right

**Divide the first polynomial by the second and state the quotient and the remainder.**

43. \( 2x^5 - x^4 + 3x^2 - x + 5, \quad x - 1 \)
   a. Quotient: \( 2x^4 + x^3 + 4x^2 + 3x \); Remainder: 8  
   b. Quotient: \( 2x^4 + x^3 - x^2 + 2x + 1 \); Remainder: 6  
   c. Quotient: \( 2x^4 - 3x^3 - x \); Remainder: 6  
   d. Quotient: \( 2x^4 + x^3 + x^2 + 4x + 3 \); Remainder: 8

**Use the rational zero test to find all the rational zeros of \( f(x) \).**

44. \( f(x) = 2x^3 + 7x^2 - 17x - 10 \)
   a. Zeros: \(-5, 2, -1\)  
   b. Zeros: \(-5, 2, -\frac{1}{2}\)  
   c. Zeros: \(5, -2, \frac{1}{2}\)  
   d. Zeros: \(5, -2, 1\)

45. Perform the indicated operations with the following complex numbers and write answers in standard form:
   \((2 + 9i)(5 + 8i)\)
   a. \(-62 - 61i\)  
   b. \(82 + 29i\)  
   c. \(72i^2 + 61i + 10\)  
   d. \(-62 + 61i\)

46. Write the following equation in exponential form: \( \log_7 49 = 2 \)
   a. \(49^2 = 7\)  
   b. \(2^7 = 49\)  
   c. \(7^2 = 49\)  
   d. \(\sqrt{49} = 7\)

47. Evaluate the logarithm: \( \ln e^5 \).
   a. \(5 \ln e\)  
   b. 1  
   c. \(e^5\)  
   d. 5

48. Expand the logarithmic expression: \( \log_b \frac{m^5 p^3}{n^2 b^7} \)
   a. \(5 \log_b m + 3 \log_b p - 2 \log_b n - 7\)  
   b. \(5 \log_b m + 3 \log_b p - 2 \log_b n + 7\)  
   c. \(\log_b m^5 + \log_b p^3 + \log_b n^2 - \log_b b^7\)  
   d. \(m^5 p^3 - n^2 b^7\)

**The augmented matrix is in row-echelon form and represents a system of linear equations. Solve the system using backward substitution:**

49. \[
\begin{bmatrix}
1 & 0 & 6 & 8 \\
0 & 1 & -2 & -9 \\
0 & 0 & 0 & 0
\end{bmatrix}
\]
   a. \((8 - z, -9 + z, z) \mid z \text{ is a real number}\)  
   b. \((8 - 6z, -9 + 2z, z) \mid z \text{ is a real number}\)  
   c. \((8, -9, z) \mid z \text{ is a real number}\)  
   d. \((8 + 6z, -9 - 2z, z) \mid z \text{ is a real number}\)

50. What is the solution to \( ax^2 + bx + c = 0 \)?
   a. \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\)  
   b. \(x = -b \pm \sqrt{b^2 - 4ac} \quad 2a\)  
   c. \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\)  
   d. \(x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}\)
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