1 What is the range of \( f(x) = |x - 3| + 2 \)?
1) \( \{x | x \geq 3\} \)
2) \( \{y | y \geq 2\} \)
3) \( \{x | x \in \text{real numbers}\} \)
4) \( \{y | y \in \text{real numbers}\} \)

2 The range of the function \( f(x) = 3|x - 4| - 5 \) is
1) \( x \geq 0 \)
2) \( f(x) \geq 0 \)
3) \( x \geq -5 \)
4) \( f(x) \geq -5 \)

3 What is the range of \( f(x) = (x + 4)^2 + 7 \)?
1) \( y \geq -4 \)
2) \( y \geq 4 \)
3) \( y = 7 \)
4) \( y \geq 7 \)

4 For what values of \( x \) will the function \( f(x) = \sqrt{x - 4} \) be real?
1) \( \{x | x < 0\} \)
2) \( \{x | x > 0\} \)
3) \( \{x | x \leq 4\} \)
4) \( \{x | x \geq 4\} \)

5 What is the domain of the function \( f(x) = \sqrt{x - 2} \)?
1) \( \{x | x \geq 0\} \)
2) \( \{x | x \geq 2\} \)
3) \( \{x | x \leq 2\} \)
4) \( \{x | x \geq -2\} \)

6 In the set of real numbers, what is the domain of \( f(x) = \sqrt{x + 5} \)?
1) \( x \geq -5 \)
2) \( x \leq -5 \)
3) \( x > -5 \)
4) \( x \geq 0 \)

7 What is the domain of the function \( f(x) = \sqrt{x - 2} + 3 \)?
1) \( (-\infty, \infty) \)
2) \( (2, \infty) \)
3) \( [2, \infty) \)
4) \( [3, \infty) \)

8 If \( f(x) = \sqrt{9-x^2} \), what are its domain and range?
1) \( \text{domain: \{x | -3 \leq x \leq 3\}; range: \{y | 0 \leq y \leq 3\}} \)
2) \( \text{domain: \{x | x \neq \pm3\}; range: \{y | 0 \leq y \leq 3\}} \)
3) \( \text{domain: \{x | x \leq -3 \text{ or } x \geq 3\}; range: \{y | y \neq 0\}} \)
4) \( \text{domain: \{x | x \neq 3\}; range: \{y | y \geq 0\}} \)

9 What is the domain of \( h(x) = \sqrt{x^2 - 4x - 5} \)?
1) \( \{x | x \geq 1 \text{ or } x \leq -5\} \)
2) \( \{x | x \geq 5 \text{ or } x \leq -1\} \)
3) \( \{x | -1 \leq x \leq 5\} \)
4) \( \{x | -5 \leq x \leq 1\} \)

10 Which statement about the function \( f(x) = \frac{x-3}{x+2} \) is true?
1) Its domain does not include 2.
2) Its domain does not include 3.
3) Its range does not include 1.
4) Its range does not include \( \frac{3}{2} \).
11 The domain of the equation \( y = \frac{1}{(x - 1)^2} \) is all real numbers
1) greater than 1
2) except 1
3) less than 1
4) except 1 and -1

12 What is the domain of the function \( f(x) = \frac{2x^2}{x^2 - 9} \)?
1) all real numbers except 0
2) all real numbers except 3
3) all real numbers except 3 and -3
4) all real numbers

13 What is the domain of the function \( f(x) = \frac{3x^2}{x^2 - 49} \)?
1) \( \{x | x \in \text{real numbers}, x \neq 7\} \)
2) \( \{x | x \in \text{real numbers}, x \neq \pm 7\} \)
3) \( \{x | x \in \text{real numbers}\} \)
4) \( \{x | x \in \text{real numbers}, x \neq 0\} \)

14 Which negative real number is not in the domain of \( \frac{3}{x^2 - 4} \)?

15 For \( y = \frac{3}{\sqrt{x - 4}} \), what are the domain and range?
1) \( \{x | x > 4\} \) and \( \{y | y > 0\} \)
2) \( \{x | x \geq 4\} \) and \( \{y | y > 0\} \)
3) \( \{x | x > 4\} \) and \( \{y | y \geq 0\} \)
4) \( \{x | x \geq 4\} \) and \( \{y | y \geq 0\} \)

16 What is the domain of the function \( f(x) = \frac{4}{\sqrt{x + 1}} \) over the set of real numbers?
1) \( \{x | x = 1\} \)
2) \( \{x | x \geq -1\} \)
3) \( \{x | x < -1\} \)
4) \( \{x | x > -1\} \)

17 What is the domain of the function \( f(x) = \frac{4}{\sqrt{x + 5}} \) over the set of real numbers?
1) \( \{x | x > -5\} \)
2) \( \{x | x < -5\} \)
3) \( \{x | x \geq -5\} \)
4) \( \{x | x = -5\} \)

18 In the set of real numbers, what is the domain of \( f(x) = \frac{4x}{\sqrt{x - 4}} \)?
1) \( x > 0 \)
2) \( x < 4 \)
3) \( x \geq 4 \)
4) \( x > 4 \)

19 The domain of \( f(x) = \frac{3}{\sqrt{2 - x}} \) is the set of all real numbers
1) greater than 2
2) less than 2
3) except 2
4) between -2 and 2

20 If \( f(x) = \frac{1}{\sqrt{2x - 4}} \), the domain of \( f(x) \) is
1) \( x = 2 \)
2) \( x < 2 \)
3) \( x \geq 2 \)
4) \( x > 2 \)
21 What is the domain of the function \( f(x) = \frac{4}{\sqrt{2x - 1}} \) over the set of real numbers?

1) \( \{ x | x = \frac{1}{2} \} \)
2) \( \{ x | x \geq \frac{1}{2} \} \)
3) \( \{ x | x < \frac{1}{2} \} \)
4) \( \{ x | x > \frac{1}{2} \} \)

22 What is the domain of \( f(x) = \frac{1}{\sqrt{4 - x^2}} \)?

1) \( x < 2 \)
2) \( |x| \leq 2 \)
3) \( -2 < x < 2 \)
4) all real numbers

23 What is the range of the function \( y = 2 \cos 3x \)?

1) \( -1 \leq y \leq 1 \)
2) \( -2 \leq y \leq 2 \)
3) \( -3 \leq y \leq 3 \)
4) \( \frac{3}{2} \leq y \leq \frac{3}{2} \)

24 What is the range of the function \( y = 2 \sin 3x \)?

1) all real numbers
2) \( -1 \leq y \leq 1 \)
3) \( -2 \leq y \leq 2 \)
4) \( -3 \leq y \leq 3 \)

25 What is the range of the function \( y = 4 \cos x \)?

1) \( -1 \leq y \leq 1 \)
2) \( -4 \leq y \leq 4 \)
3) \( y \geq 0 \)
4) \( y \leq 4 \)

26 Which is not in the range of the function \( y = \cos x \)?

1) \( 1 \)
2) \( 2 \)
3) \( \frac{1}{2} \)
4) \( -\frac{1}{2} \)

27 Which number is not an element of the range of \( y = \sin x \)?

1) \( 1 \)
2) \( 2 \)
3) \( -1 \)
4) \( 0 \)

28 In which function is the range equal to the domain?

1) \( y = 2^x \)
2) \( y = x^2 \)
3) \( y = \log x \)
4) \( y = x \)
F.IF.A.2: Domain and Range 4a

Answer Section

1 ANS: 2 REF: 011222a2
2 ANS: 4 REF: 011719a2
3 ANS: 4 REF: 061112a2
4 ANS: 4 REF: 069031siii
5 ANS: 2 REF: 068031siii
6 ANS: 1 REF: 060135siii
7 ANS: 3 REF: fall0923a2
8 ANS: 1 REF: 011313a2
9 ANS: 2

For real solutions, the expression under the radical must be greater than or equal to zero.

\[ x^2 - 4x - 5 \geq 0 \]

For the product of these two binomials to be positive, both binomials must be either positive or negative.

\[ (x - 5)(x + 1) \geq 0 \]

\[ x - 5 \geq 0 \quad \text{and} \quad x + 1 \geq 0 \]

\[ x - 5 \leq 0 \quad \text{and} \quad x + 1 \leq 0 \]

\[ x \geq 5 \quad \text{and} \quad x \leq -1 \]

\[ x \leq 5 \quad \text{and} \quad x \geq -1 \]

REF: 010218b

10 ANS: 3

\[ 1 = \frac{x - 3}{x + 2} \]

\[ x + 2 = x - 3 \]

\[ 0 \neq -5 \]

REF: 081623a2

11 ANS: 2 REF: 069725siii

12 ANS: 3

If \( x = 3 \) or -3, the denominator of the function is zero, which is undefined.

REF: 060407b

13 ANS: 2

If \( x = 7 \) or -7, the denominator of the function is zero, which is undefined.

REF: 010504b
14. ANS: -2
   REF: 010005siii
15. ANS: 1 REF: 011416a2
16. ANS: 4 REF: 068728siii
17. ANS: 1 REF: 010228siii
18. ANS: 4 REF: 010424siii
19. ANS: 2 REF: 011521a2
20. ANS: 4

\[ 2x - 4 > 0 \]
\[ 2x > 4 \]
\[ x > 2 \]

REF: 010314b
21. ANS: 4 REF: 080227siii
22. ANS: 3 REF: 069829siii
23. ANS: 2 REF: 069429siii
24. ANS: 3 REF: 010125siii
25. ANS: 2 REF: 060324siii
26. ANS: 2 REF: 018420siii
27. ANS: 2 REF: 019617siii
28. ANS: 4 REF: 088716siii