Domain and Range Practice

1. Given the points: $(1, 3)$, $(2, 5)$, $(3, 7)$, determine the domain and range.
2. Given the function $f(x) = x^2 - 4$, determine the domain and range.
3. Given the set of points: $(0, -2)$, $(1, 0)$, $(2, 4)$, $(-1, -1)$, determine the domain and range.
4. For the function $g(x) = \frac{1}{x-3}$, determine the domain and range.
5. Given the function $f(x) = \sqrt{x + 2}$, determine the domain and range.
6. Given the set of points: $(-3, 5)$, $(0, 2)$, $(1, 6)$, $(4, -1)$, determine the domain and range.
7. For the function $h(x) = \frac{2}{x^2+1}$, determine the domain and range.
8. Given the points: $(-1, 4)$, $(2, 8)$, $(3, 9)$, $(5, 12)$, determine the domain and range.
9. For the function $f(x) = |x - 1|$, determine the domain and range.
10. Given the set of points: $(-2, 3)$, $(0, 1)$, $(3, -1)$, $(4, 0)$, determine the domain and range.

Domain and Range Practice - Answers with Explanations

(a) Given the points: $(1, 3)$, $(2, 5)$, $(3, 7)$, determine the domain and range.

Answer:

Domain: $\{1, 2, 3\}$

Range: $\{3, 5, 7\}$

Explanation: The domain consists of all the x-values from the points, and the range consists of all the y-values from the points. Here, the domain is $\{1, 2, 3\}$ and the range is $\{3, 5, 7\}$.

(b) Given the function $f(x) = x^2 - 4$, determine the domain and range.

Answer:

Domain: $\mathbb{R}$ (all real numbers)

Range: $[-4, \infty)$

Explanation: The function $f(x) = x^2 - 4$ is a quadratic function, and quadratic functions have a domain of all real numbers. The range is determined by the minimum value of $x^2 - 4$, which occurs when $x = 0$, giving -4. The range extends from -4 to infinity.

(c) Given the set of points: $(0, -2)$, $(1, 0)$, $(2, 4)$, $(-1, -1)$, determine the domain and range.

Answer:

Domain: $\{-1, 0, 1, 2\}$

Range: $\{-2, -1, 0, 4\}$

Explanation: The domain consists of the x-values from the points, and the range consists of the corresponding y-values. Here, the domain is $\{-1, 0, 1, 2\}$ and the range is $\{-2, -1, 0, 4\}$.

(d) For the function $g(x) = \frac{1}{x-3}$, determine the domain and range.

Answer:

Domain: $\mathbb{R} \setminus \{3\}$

Range: $\mathbb{R} \setminus \{0\}$

Explanation: The function has a denominator $x - 3$, so $x = 3$ would make the denominator zero, which is undefined. Thus, the domain excludes 3. The range excludes 0 because the function never equals zero (since the denominator can never be zero).

(e) Given the function $f(x) = \sqrt{x + 2}$, determine the domain and range.

Answer:

Domain: $[-2, \infty)$

Range: $[0, \infty)$

Explanation: Since the square root function requires the expression under the square root to be non-negative, we need $x + 2 \geq 0$, or $x \geq -2$. Therefore, the domain is $[-2, \infty)$. The range starts at 0 (when $x = -2$) and goes to infinity.

(f) Given the set of points: $(-3, 5)$, $(0, 2)$, $(1, 6)$, $(4, -1)$, determine the domain and range.

Answer:

Domain: $\{-3, 0, 1, 4\}$

Range: $\{5, 2, 6, -1\}$

Explanation: The domain consists of the x-values from the points, and the range consists of the y-values from the points. Here, the domain is $\{-3, 0, 1, 4\}$ and the range is $\{5, 2, 6, -1\}$.

(g) For the function $h(x) = \frac{2}{x^2+1}$, determine the domain and range.

Answer:

Domain: $\mathbb{R}$ (all real numbers)

Range: $(0, 2]$

Explanation: The function is defined for all real values of x because the denominator $x^2 + 1$ is always positive and never zero. The range is from 0 to 2, since the maximum value occurs when $x = 0$, giving $h(0) = 2$, and the function decreases toward 0 as $x \to \infty$ or $x \to -\infty$.

(h) Given the points: $(-1, 4)$, $(2, 8)$, $(3, 9)$, $(5, 12)$, determine the domain and range.

Answer:

Domain: $\{-1, 2, 3, 5\}$

Range: $\{4, 8, 9, 12\}$

Explanation: The domain consists of the x-values from the points, and the range consists of the y-values from the points. Here, the domain is $\{-1, 2, 3, 5\}$ and the range is $\{4, 8, 9, 12\}$.

(i) For the function $f(x) = |x - 1|$, determine the domain and range.

Answer:

Domain: $\mathbb{R}$ (all real numbers)

Range: $[0, \infty)$

Explanation: The absolute value function is defined for all real numbers, so the domain is $\mathbb{R}$. The range starts at 0 (when $x = 1$) and increases without bound.

(j) Given the set of points: $(-2, 3)$, $(0, 1)$, $(3, -1)$, $(4, 0)$, determine the domain and range.

Answer:

Domain: $\{-2, 0, 3, 4\}$

Range: $\{3, 1, -1, 0\}$

Explanation: The domain consists of the x-values from the points, and the range consists of the y-values from the points. Here, the domain is $\{-2, 0, 3, 4\}$ and the range is $\{3, 1, -1, 0\}$.