Domain and Range Quiz Questions and Answers PDF

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What is the range of the function f(x) = √x?

- ◯ (-∞, ∞)
- ◯ **[0, ∞) ✓**
- ◯ (-∞, 0]
- ◯ [0, 1]

> The range of the function f(x) = √x is all non-negative real numbers, starting from 0 and extending to positive infinity. This is because the square root of any non-negative number is always non-negative.

Which of the following functions has a range of all real numbers?

- ◯ f(x) = x^2
- ◯ **f(x) = x^3 ✓**
- ◯ f(x) = √x
- ◯ f(x) = 1/x

> The function that has a range of all real numbers is typically a linear function or a quadratic function that opens upwards or downwards without restrictions. For example, the function f(x) = x is a simple linear function with a range of all real numbers.

Which functions have a range of (0, ∞)? (Select all that apply)

- ☐ **f(x) = e^x ✓**
- ☐ f(x) = ln(x)
- ☐ **f(x) = x^2 + 1 ✓**
- ☐ f(x) = 1/x

> Functions that have a range of (0, ∞) are those that only produce positive outputs. Common examples include exponential functions like f(x) = e^x and certain power functions like f(x) = x^n for n > 0.

For the function f(x) = sin(x), what is the range?

- ◯ (-∞, ∞)
- ◯ [0, 1]
- ◯ **[-1, 1] ✓**
- ◯ (0, ∞)

> The range of the function f(x) = sin(x) is the set of all possible output values, which are between -1 and 1, inclusive. This means that for any input x, the output of sin(x) will always fall within the interval [-1, 1].

What is the range of the function f(x) = e^x?

- ◯ (-∞, ∞)
- ◯ [0, ∞)
- ◯ **(0, ∞) ✓**
- ◯ [-1, 1]

> The range of the function f(x) = e^x is all positive real numbers, which can be expressed as (0, ∞). This means that as x approaches negative infinity, f(x) approaches 0, but never actually reaches it.

Which of the following describes the domain of f(x) = ln(x)?

- ◯ (-∞, ∞)
- ◯ **(0, ∞) ✓**
- ◯ [0, ∞)
- ◯ (-∞, 0]

> The domain of the function f(x) = ln(x) is all positive real numbers, which can be expressed as (0, ∞). This is because the natural logarithm is only defined for positive values of x.

What is the domain of the function f(x) = 1/(x-2)?

- ◯ (-∞, ∞)
- ◯ **(-∞, 2) ∪ (2, ∞) ✓**
- ◯ [2, ∞)
- ◯ (2, ∞)

> The domain of the function f(x) = 1/(x-2) includes all real numbers except for x = 2, where the function is undefined due to division by zero.

Which of the following are true about the function f(x) = cos(x)? (Select all that apply)

- ☐ **Domain is all real numbers ✓**

- [x] **Range is [-1, 1] ✓**
- [x] **It is a periodic function ✓**
- [ ] It has vertical asymptotes

> The function f(x) = cos(x) is periodic with a period of 2π, oscillates between -1 and 1, and is an even function. It is also differentiable and continuous for all real numbers.

Which of the following functions have a domain of all real numbers? (Select all that apply)

- [x] **f(x) = x^2 + 3x + 2 ✓**
- [ ] f(x) = 1/(x-1)
- [x] **f(x) = sin(x) ✓**
- [ ] f(x) = √x

> Functions that have a domain of all real numbers typically include linear functions, polynomial functions, and certain trigonometric functions. However, functions with restrictions, such as those involving square roots or denominators, may not have all real numbers as their domain.

Explain how to determine the domain of a rational function.

> **To determine the domain of a rational function, identify the values of x that make the denominator equal to zero and exclude those values from the domain.**

Describe the process of finding the range of a quadratic function.

To find the range of a quadratic function, analyze the vertex to determine the minimum or maximum value, depending on whether the parabola opens upward or downward. This value helps define the range of the function.

What is the significance of the vertical line test in relation to domain and range?

The vertical line test is significant because it helps determine if a graph represents a function by ensuring that each input (x-value) corresponds to only one output (y-value). If a vertical line intersects the graph at more than one point, it is not a function.

How does the concept of asymptotes affect the domain and range of a function?

Asymptotes affect the domain and range of a function by indicating values that the function approaches but never reaches. This can exclude certain x-values from the domain and limit y-values in the range.

Provide an example of a piecewise function and explain how to determine its domain and range.

An example of a piecewise function is f(x) = { x^2, x < 0; x + 1, x ≥ 0 }. To determine its domain, consider the domains of each piece, which in this case is all real numbers. To find the range, evaluate the outputs of each piece: the first piece has a range of [0, ∞) and the second piece has a range of [1, ∞), so the overall range is [0, ∞).

Discuss how the domain and range of a function are affected when it is composed with another function.

When composing functions, the domain of the composite function is restricted to the domain of the inner function, and the range of the inner function must fit within the domain of the outer function. The overall range is determined by evaluating the outputs of the composite function.

For the function f(x) = 1/(x^2 - 1), which values are excluded from the domain? (Select all that apply)

- [ ] x = 0
- [ ] **x = 1 ✓**
- [ ] **x = -1 ✓**
- [ ] x = 2

The values excluded from the domain of the function f(x) = 1/(x^2 - 1) are those that make the denominator zero. In this case, x = 1 and x = -1 are excluded from the domain.

Which of the following functions has a domain of all real numbers?

- ○ f(x) = 1/x
- ○ f(x) = ln(x)
- ○ **f(x) = x^3 ✓**
- ○ f(x) = √x

A function has a domain of all real numbers if it does not have any restrictions such as division by zero or square roots of negative numbers. Common examples include linear functions and polynomial functions.

What is the domain of the function f(x) = x^2?

- ◯ **(-∞, ∞) ✓**
- ◯ [0, ∞)
- ◯ (-∞, 0]
- ◯ [0, 1]

> The domain of the function f(x) = x^2 is all real numbers, as there are no restrictions on the values that x can take. This means that x can be any value from negative infinity to positive infinity.

Which of the following functions have restricted domains due to division by zero? (Select all that apply)

- ☐ **f(x) = 1/x ✓**
- ☐ **f(x) = 1/(x-2) ✓**
- ☐ f(x) = x^2
- ☐ **f(x) = (x+1)/(x^2-4) ✓**

> Functions that involve division by a variable can have restricted domains where the denominator equals zero, as this leads to undefined values. Identifying these functions is crucial to understanding their behavior and limitations.

Which of the following functions have a range of [0, ∞)? (Select all that apply)

- ☐ **f(x) = x^2 ✓**
- ☐ **f(x) = √x ✓**
- ☐ f(x) = e^x
- ☐ **f(x) = |x| ✓**

> Functions that have a range of [0, ∞) include those that output non-negative values, such as quadratic functions with a minimum at zero or exponential functions. Examples include f(x) = x^2 and f(x) = e^x.