MATHEMATICS · GRADES 10-12

Restrictions on domain and range

Difficulty level: Advanced

Mathematics: Grades 10-12

This document was made by AI and there may be mistakes. If a question or answer looks wrong, use the Flag a mistake button to let Brett know so he can fix it.

Overview of the concept

This is how you know which inputs a formula can actually take, like a speed that cannot be negative or a recipe that cannot serve zero people. A speed of minus twenty makes no sense, and a recipe for zero people has no ingredients to work out. A square root of a negative length and a division by zero are the same kind of impossibility, since no real answer exists. Knowing the limits of a formula keeps you from asking it a question it cannot answer.



Rule

A denominator can never be zero.

The number under a square root can never be negative. Those two facts give the domain of a function: exclude every x that breaks either one.

© 2026 Brett Robbins. All Rights Reserved.

Worked examples

EXAMPLE 1

Q Find the restriction for $f(x) = \frac{1}{(x - 3)}$



SOLUTION

Set the denominator to zero: $x - 3 = 0$, so $x = 3$

Zero can never sit in a denominator, so $x = 3$ is excluded.

So the domain is all real numbers except 3.

EXAMPLE 2

Q Find the restriction for $f(x) = \sqrt{x-2}$



SOLUTION

What sits under the square root must not come out negative.

$x - 2 \geq 0$

$x \geq 2$

So the domain is $x \geq 2$.

© 2026 Brett Robbins. All Rights Reserved.

Practice questions

1 $f(x) = \frac{1}{(x - 5)}$. Find the domain.

- **A** all real numbers except 5
- **B** all real numbers except -5
- **C** x is greater than or equal to 5
- **D** all real numbers

Understand It with Pulse | Flag a mistake

2 $f(x) = \frac{1}{(x + 2)}$. Find the domain.

- **A** all real numbers except 2
- **B** all real numbers except -2
- **C** x is greater than or equal to -2
- **D** all real numbers

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

3 $f(x) = \sqrt{x-4}$. Find the domain.

- **A** x is greater than or equal to -4
- **B** x is greater than or equal to 4
- **C** x is less than or equal to 4
- **D** all real numbers except 4

Understand It with Pulse | Flag a mistake

4 $f(x) = \sqrt{x+3}$. Find the domain.

- **A** x is greater than or equal to 3
- **B** x is less than or equal to -3
- **C** all real numbers except -3
- **D** x is greater than or equal to -3

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

5 $f(x) = \frac{1}{(x^2 - 9)}$. Which x values are excluded from the domain?

- **A** 3 and -3
- **B** 3 only
- **C** -3 only
- **D** 0

Understand It with Pulse | Flag a mistake

6 $f(x) = \sqrt{2x-6}$. Find the domain.

- **A** x is greater than or equal to 6
- **B** x is less than or equal to 3
- **C** x is greater than or equal to 3
- **D** all real numbers except 3

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

7 $f(x) = \frac{1}{x}$. Find the domain.

- **A** all real numbers except 0
- **B** all real numbers except 1
- **C** x is greater than or equal to 0
- **D** all real numbers

Understand It with Pulse | Flag a mistake

8 $f(x) = \sqrt{x}$. Find the domain.

- **A** x is greater than or equal to 0
- **B** x is greater than 0
- **C** x is less than or equal to 0
- **D** all real numbers except 0

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

9 $f(x) = 1/(x - 1)$. Is $x = 1$ in the domain? Answer yes or no.

- **A** Yes
- **B** No

Understand It with Pulse | Flag a mistake

10 $f(x) = \sqrt{5-x}$. Find the domain.

- **A** x is greater than or equal to 5
- **B** x is less than or equal to 5
- **C** x is less than or equal to -5
- **D** all real numbers except 5

Understand It with Pulse | Flag a mistake

© 2026 Brett Robbins. All Rights Reserved.

ANSWER KEY

1. all real numbers except 5

2. all real numbers except -2

3. x is greater than or equal to 4

4. x is greater than or equal to -3

5. 3 and -3

6. x is greater than or equal to 3

7. all real numbers except 0

8. x is greater than or equal to 0

9. No

10. x is less than or equal to 5

© 2026 Brett Robbins. All Rights Reserved.