

EUEE MATHS QUESTIONS

CHAPTER ONE

(2008-2016)

Which of the following is one-to-one correspondence function from $A = [0, 1]$ to $B = [1, 2]$?

A. $f(x) = x$

C. $f(x) = 2x + 1$

B. $f(x) = \frac{1}{3}x^3 + 1$

D. $f(x) = x^2 + 1$

Answer; D

For x an element of $[0, 1]$,

$$0 \leq x \leq 1$$

$$0 \leq x^2 \leq 1$$

Adding 1 to each:

$$0 + 1 \leq x^2 + 1 \leq 1 + 1$$

$$1 \leq x^2 + 1 \leq 2$$

f is onto.



Now, check whether $f(x)$ is 1 – 1 or not.

Let c_1 and c_2 be an element of $[0, 1]$

c_1 and c_2 are not equal.

$$f(c_1) \neq f(c_2)$$

$c_1^2 + 1 \neq c_2^2 + 1$ f is one to one function.

Since f is onto and one-to-one function, it is one-to-one correspondence.

CHAPTER ONE -EUEE MATHS QUESTIONS

2008E.C

If $f: A \rightarrow B$ and $g: B \rightarrow C$ are functions, then which one of the following is true about the composition function?

A. Domain of $(g \circ f) \subseteq$ Domain of f

C. Domain of $(g \circ f) \not\subseteq$ Domain of f

B. Range of $(g \circ f) \not\subseteq$ Range of g

D. Range of $(g \circ f) \subseteq$ Range of f

Answer; A

Domain of $(g \circ f) \subseteq$ Domain of f .

A. Domain of $(g \circ f) \subseteq$ Domain of f :

This statement is **true**. The domain of $g \circ f$ consists of all $x \in A$ such that $f(x)$ is in the domain of g . Since $f(x)$ returns values in B , it must hold that A is at least as large as the domain contributing to g .

B. Domain of $(g \circ f) \not\subseteq$ Range of g :

This statement **does not make sense** in this context. The domain of $(g \circ f)$ has to do with the values produced by f that are fed into g ; any $f(x)$ that is valid for g must belong in B , not necessarily in the range of g .

C. Domain of $(g \circ f) \not\subseteq$ Domain of f :

This is **incorrect** because the domain of $(g \circ f)$ is defined by the domain of f and must stay within it.

D. Range of $(g \circ f) \subseteq$ Range of f :

This is also incorrect. The range of $(g \circ f)$ consists of the outputs of g after applying f , so the outputs from g may not directly map back into the range of f .

If the point $(3, -2)$ is on the graph of $y = f(x)$, which point is on the graph of $y = f^{-1}(x)$?

- A. $(\frac{1}{3}, -2)$ B. $(3, -1)$ C. $(-2, 3)$ D. $(3, -\frac{1}{2})$

Answer; C

The x and y are interchanged in reverse function.

If point $(3, -2)$ lies on the graph of

$y = f(x)$, then point $(-2, 3)$ lies on the graph

of $y = f^{-1}(x)$.

Which of the following functions is one-to-one correspondence?

- A. $f: [0, \infty) \rightarrow \mathbb{R}$ defined by $f(x) = |x|$. C. $f: \mathbb{R} \rightarrow [0, \infty)$ defined by $f(x) = 3^x$
 B. $f: \mathbb{R} \rightarrow [0, \infty)$ defined by $f(x) = x^2$ D. $f: (0, \infty) \rightarrow \mathbb{R}$ defined by $f(x) = \log_2 x$

Answer; D

Range of $\log_2 x$ is $\mathbb{R}$.

So, f is onto.

For $x > 0$, $\log_2 x$ is one to one.

Since both conditions are fulfilled, $\log_2 x$ is one to one correspondence.

CHAPTER ONE -EUEE MATHS QUESTIONS

2009E.C

If $f(x) = \sqrt{x^3}$ and $(f \circ g)(x) = \sqrt[4]{x}$, then what is the value of $g(8)$?

A. $\sqrt[3]{2}$

B. 2

C. $\sqrt{2}$

D. $2\sqrt{2}$

Answer; C

• Calculate for $g(x)$.

$(f \circ g)(x) = f(g(x))$



$f(g(x)) = \sqrt[4]{x}$

$f(x) = \sqrt{x^3}$

• Substitute $g(x)$ inside $\sqrt{x^3}$.

$f(g(x)) = \sqrt{g(x)^3}$

$\sqrt{g(x)^3} = \sqrt[4]{x}$

$g(x)^3 = (\sqrt[4]{x})^2$

$g(x) = \sqrt[3]{(\sqrt[4]{x})^2} = x^{(\frac{1}{4})(2)(\frac{1}{3})} = x^{\frac{1}{6}}$

Then substitute 8 inside $g(x)$.

$g(x) = 8^{\frac{1}{6}} = (2^3)^{\frac{1}{6}} = \sqrt{2}$

CHAPTER ONE -EUEE MATHS QUESTIONS

2009E.C

Which of the following is the inverse of $f(x) = 8x^3 + 2$?

A. $f^{-1}(x) = \frac{1}{8x^3+2}$

C. $f^{-1}(x) = 8x^{-3} - 2$

B. $f^{-1}(x) = \frac{1}{2} \sqrt[3]{x-2}$

D. $f^{-1}(x) = \frac{1}{8} \sqrt[3]{x-2}$

Answer; B

$$f(x) = 8x^3 + 2$$

$$y = 8x^3 + 2$$

• Step1: interchange x and y.

$$x = 8y^3 + 2$$

• Step2: Solve for y in terms of x.

$$8y^3 = x - 2$$

$$y^3 = \frac{x-2}{8}$$

$$y = \sqrt[3]{\frac{x-2}{8}} = \frac{\sqrt[3]{x-2}}{\sqrt[3]{8}} = \frac{\sqrt[3]{x-2}}{2}$$

$$y = \frac{1}{2} \sqrt[3]{x-2}$$

Which of the following is true about signum, absolute value and greatest integer functions?

A. $\text{sgn}(x) = \pm|x|$, for all $x \in \mathbb{R}$.

C. $|x| = x \text{sgn}(x)$, for all $x \in \mathbb{R}$.

B. $\text{sgn}(x) \leq [x]$, for all $x \leq 0$

D. $\text{sgn}(x) \leq [x]$, for all $x \geq 0$

Answer; C

$$|x| = \begin{cases} x & \text{for } x > 0 \\ 0 & \text{for } x = 0 \\ -x & \text{for } x < 0 \end{cases}$$

$$x \text{sgn} x = \begin{cases} x & \text{for } x > 0 \\ 0 & \text{for } x = 0 \\ -x & \text{for } x < 0 \end{cases}$$

Hence, $x = x \text{sgn} x$ for $x \in \mathbb{R}$

Let $f(x) = x - x^2$ and $g(x) = \frac{1}{x}$. Then $g(f(\frac{1}{x}))$ is equal to:

A. $x - x^2$

B. $\frac{x^2}{x-1}$

C. $\frac{1}{x^2-1}$

D. $\frac{x-1}{x^2}$

Answer; B

Given: $f(x) = x - x^2$, $g(x) = \frac{1}{x}$

$$g(f(\frac{1}{x})) = g(\frac{1}{x} - (\frac{1}{x})^2)$$

$$g(f(\frac{1}{x})) = g(\frac{1}{x} - \frac{1}{x^2}) = g((x^2 - x)/(x^3))$$

$$g(f(\frac{1}{x})) = 1/((x^2 - x)/(x^3)) = \frac{x^3}{x^2 - x}$$

$$g(f(\frac{1}{x})) = \frac{(x^3)}{x(x-1)} = \frac{(x^2)}{x-1}$$

If f is greatest integer function and g is absolute value function, then what is the value of $((f \circ g)\left(\frac{3}{2}\right) + (g \circ f)\left(-\frac{4}{3}\right))$?

A. 1

B. 3

C. -1

D. 2

Answer; B

Solution

$$f(X) = [x] \quad , \quad g(X) = |x|$$

$$= (f \circ g)\left(\frac{3}{2}\right) + (g \circ f)\left(-\frac{4}{3}\right)$$

$$f\left(g\left(\frac{3}{2}\right)\right) + g\left(f\left(-\frac{4}{3}\right)\right)$$

$$\text{where } g\left(\frac{3}{2}\right) = \left|\frac{3}{2}\right| = \frac{3}{2} = 1.5$$

$$\text{and } f\left(-\frac{4}{3}\right) = \left[-\frac{4}{3}\right] = [-1.33] = -2$$

$$= f\left(\frac{3}{2}\right) + g(-2) = [1.5] + |-2| = 1 + 2 = 3,$$

If $f(x) = ax - b$ and $f^{-1}(x + 1) = \frac{1}{2}x + 2$, for each $x \in \mathbb{R}$, then what must be the value of a and b ?

A. $a = \frac{1}{2}, b = -2$

C. $a = 1, b = 1$

B. $a = 2, b = 2$

D. $a = 2, b = 3$

Answer; D

Solution

$$f(x) = ax - b, \quad f^{-1}(x + 1) = \frac{1}{2}x + 2$$

$$y = ax - b$$

$$x = ay - b$$

$$ay = x + b$$

$$y = \frac{x+b}{a}, f^{-1}(x) = \frac{x+b}{a}$$

$$f^{-1}(x + 1) = \frac{x+1+b}{a} = \frac{x}{a} + \frac{1+b}{a}$$

$$\Rightarrow \frac{1}{2}x + 2 = \frac{x}{a} + \frac{1+b}{a}$$

$$\frac{1}{2} = \frac{1}{a}, \quad 2 = \frac{1+b}{2}$$

$$2 = a, \quad 2 = \frac{1+b}{2}$$

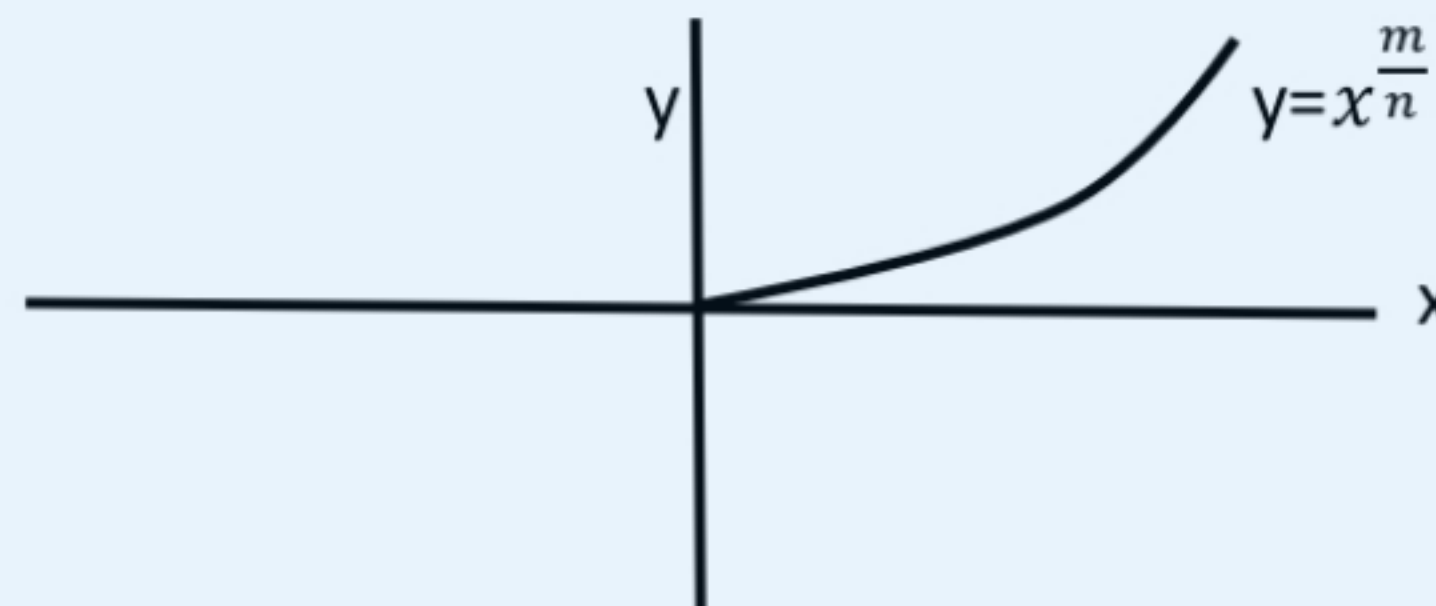
$$4 = 1+b$$

$$4-1=b$$

$$3=b$$

1. The following graph is the graph of the function $y = x^{\frac{m}{n}}$, where m and n are positive integers and $n \neq 0$. Which one of the following is true about m and n ?

- A. m is odd, n is even and $m > n$
- B. m is even, n is odd and $m < n$
- C. m is odd, n is even and $m < n$
- D. m is even, n is odd and $m > n$



Answer; A

Solution

$\Rightarrow m = \text{odd},$

$n = \text{even},$

$m > n$

2. Let $f(x) = \sqrt{x+2}$, and $g(x) = x^2-1$. What are the domain and range of the composition of f with g , $(f \circ g)$ respectively?

- A. $\mathbb{R}$ and $[1, \infty)$
- B. $\mathbb{R}$ and $[0, \infty)$
- C. $[0, \infty)$ and $[1, \infty)$
- D. $[0, \infty)$ and $[0, \infty)$

Answer; A

Solution

$$f(x) = \sqrt{x+2},$$

$$g(x) = x^2 - 1$$

$$(f \circ g)(x) = f(g(x)) = \sqrt{x^2 - 1 + 2} = \sqrt{x^2 + 1}$$

$$\text{Dom} = \mathbb{R}, \text{ range} = \{y: y \geq 1\} = [1, \infty)$$

3. Let $f(x)=3-2x$. What is the inverse of f ?

A. $f^{-1}(x)=2x-3$

B. $f^{-1}(x)=3+2x$

C. $f^{-1}=\frac{3}{2}-\frac{x}{2}$

D. $f^{-1}=\frac{x}{2}-\frac{3}{2}$

Answer; C

Solution

$$f(x) = 3 - 2x$$

$$y = 3 - 2x$$

$$x = 3 - 2y$$

$$2y = -x + 3$$

$$y = \frac{-x + 3}{2}$$

$$y = \frac{-x}{2} + \frac{3}{2} = f^{-1}(x)$$

To find inverse
interchange x and y ,
then find y interms of x

1. What are the domain and range of the function $f(x) = 2x^{3/4}$ respectively?

- A. $[0, \infty)$ and $(0, \infty)$ B. $\mathbb{R}$ and $[0, \infty)$ C. $[0, \infty)$ and $\{0, \infty\}$ D. $[0, \infty)$ and $\mathbb{R}$

Answer; D

Solution

$$\begin{aligned} y &= 2x^{3/4} \\ x &= 2y^{3/4} \\ x^{4/3} &= y(2^{4/3}) \end{aligned}$$

$$f(x) = 2x^{3/4} = 2\sqrt[4]{x^3}, x \geq 0, \quad \text{domain} = [0, \infty)$$

Note i) Domain of $f(x)$ = range of $f^{-1}(x)$

ii) Range of $f(x)$ = Domain of $f^{-1}(x)$

$$y = f^{-1}(x) = \left(\frac{x}{2}\right)^{4/3},$$

Domaino of $f^{-1}(x) = \mathbb{R}$ = range of $f(x)$

2. Which one of the following defines a one-to-one function?

- A. $f = \{(x, y): y = 3x-1\}$
- B. $f = \{(x, y): x \text{ is a sister of } y\}$
- C. $f = \{(x, y): y \text{ is a father of } X\}$
- D. $f = \{(x, y): Y = X^2 + 1\}$

Answer; A

Solution

- A) $y = 3x - 1$, $x_1 \neq x_2 \rightarrow f(x_1) \neq f(x_2)$ – one to one function
- B) $f = \{(s, B_1), (s, B_2)\}$ eg: –s has two brothers B_1, B_2 , Not one to one function
- C) $f = \{(s_1, F), (s_2, F)\}$ eg – Father F has two s and s_1, s_2 , Not one to one function
- D) $y = x^2 + 1 \Rightarrow -2 \neq 2$ but $f(2) = f(-2)$, not one to one function

Horizontal line test
If a horizontal line touches the graph at most once, then the function is one to one.
 $Y=3x-1$ is one to one

3. The inverse of the function $y = 3x - 5$ is equal to

A. $y = \frac{x+3}{5}$

B. $y = \frac{x+5}{3}$

C. $y = -5x + 3$

D. $y = \frac{x-5}{3}$

Answer; B

Solution

$$y = 3x - 5$$

$$x = 3y - 5$$

$$3y = x + 5$$

$$y = \frac{x+5}{3}$$

Which one of the following is an onto function from $\mathbb{R}$ onto $[0, \infty)$?

A. $F(x) = |x| + 2$

B. $F(x) = \sqrt{x^2}$

C. $F(x) = 2^x$

D. $F(x) = x^2 + 1$

Answer; B

Explanation

look at each choices

Choice A: $f(x) = |x| + 2$ Range of f : $[2, \infty)$

Choice B: $f(x) = \sqrt{x^2}$ Range of f : $[0, \infty)$

Choice C: $f(x) = 2^x$ Range of f : $(0, \infty)$

Choice D: $f(x) = x^2 + 1$ Range of f : $[1, \infty)$

CHAPTER ONE -EUEE MATHS QUESTIONS

2014E.C

3. The graph of a certain relation R is represented by the shaded region shown on the figure below

Which one of the following pairs of sets respectively gives the domain and range of this relation?

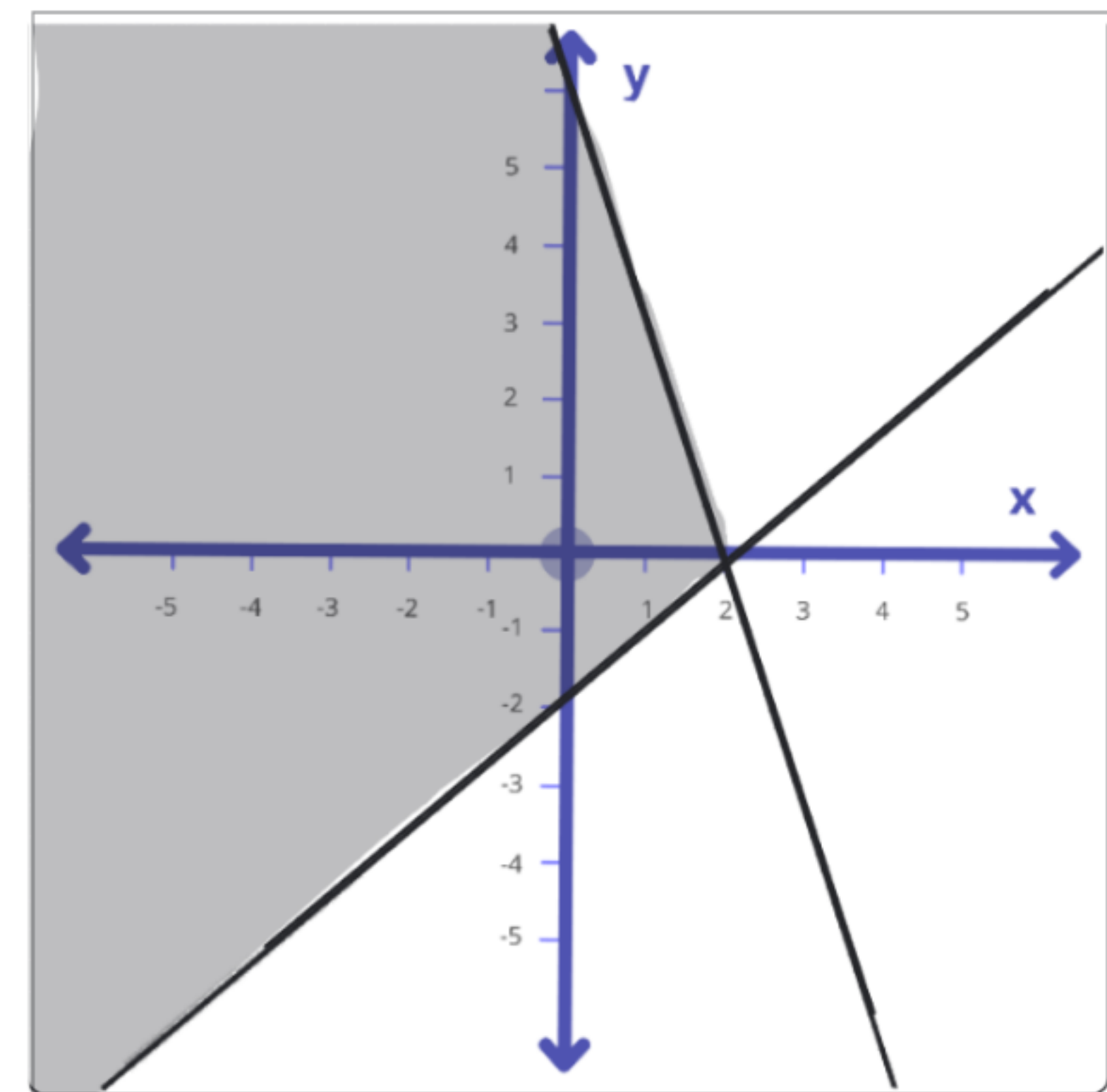
- A. $\{x / x \leq 2\}$ and $\mathbb{R}$
- B. $\{x / x \leq 2\}$ and $\{y / y \leq 6\}$
- C. $\mathbb{R}$ and $\mathbb{R}$
- D. $\mathbb{R}$ and $\{y / y \leq 2\}$

Answer; A

Explanation

Domain = $(-\infty, 2] = x \leq 2$

Range $(-\infty, \infty) = \mathbb{R}$



Let $R = \{(x, y) \mid y \geq x^2 + 1 \text{ and } y \leq 5\}$ be a relation. Then which one of the following defines the inverse of R .

- A. $\{(x, y) \mid x \leq y^2 + 1, x \geq 5\}$
- B. $\{(x, y) \mid x \geq y^2 - 1, x \leq 5\}$
- C. $\{(x, y) \mid x \geq y^2 + 1, x \leq 5\}$
- D. $\{(x, y) \mid x \geq y^2 + 1, x \geq 5\}$

Answer; C

Explanation

The inverse of a relation (R^{-1}) is obtained by interchanging the elements or coordinates of each ordered pair.

Let $R = \{(x, y) \mid y = ax \setminus \text{Then}$

$$R^{-1} = \{(x, y) \mid x = ay \}$$

For

$$R = \{(x, y) \mid y \geq x^2 + 1, y \leq 5\}$$

$$R^{-1} = \{(x, y) \mid x \geq y^2 + 1, x \leq 5\}$$

Let $f(x) = (x + 1)/(x - 1)$ and $g(x) = \sqrt{x + 2}$ be two functions. Which one of the following about the combination values of f and g at $x = 2$

- A. $(fg)(2) = 6$
- B. $(\frac{f}{g})(2) = 2/3$
- C. $(f + g)(2) = 3$
- D. $(f - g)(2) = -1$

Answer; A

1. $(fg)(2)$

- This represents the product of $f(x)$ and $g(x)$ evaluated at $x = 2$.
- $f(2) = (2 + 1) / (2 - 1) = 3$
- $g(2) = \sqrt{2 + 2} = 2$
- $(fg)(2) = f(2) g(2) = 3 \cdot 2 = 6$

2. $(f/g)(2)$

- This represents the quotient of $f(x)$ and $g(x)$ evaluated at $x = 2$.
- $f(2) = 3$ (from above)
- $g(2) = 2$ (from above)
- $(f/g)(2) = f(2) / g(2) = 3 / 2$

3. $(f + g)(2)$

- This represents the sum of $f(x)$ and $g(x)$ evaluated at $x = 2$.
- $f(2) = 3$ (from above)
- $g(2) = 2$ (from above)
- $(f + g)(2) = f(2) + g(2) = 3 + 2 = 5$

4. $(f - g)(2)$

- This represents the difference of $f(x)$ and $g(x)$ evaluated at $x = 2$.
- $f(2) = 3$ (from above)
- $g(2) = 2$ (from above)
- $(f - g)(2) = f(2) - g(2) = 3 - 2 = 1$

Therefore, the correct answer is A. $(fg)(2) = 6$

Which one of the following is an onto function from $\mathbb{R}$ onto $\mathbb{R}$?

- A. $f(x) = 2x - 3x^2$
- B. $f(x) = 5x^3 + 1$
- C. $f(x) = |x - 1|$
- D. $F(x) = \sqrt{x^2 + 1}$

Answer; B

Understanding “Onto” Functions

A function is onto (surjective) if for every element y in the codomain (the set where the outputs live), there exists at least one element x in the domain (the set of inputs) such that $f(x) = y$. In other words, every possible output value is actually “hit” by the function.

- A. $F(x) = 2x - 3x^2$

This function is a parabola. Parabolas have a maximum or minimum point and extend infinitely in one direction. This means there are some values of y^* that the function will never reach. Not onto.

- B. $F(x) = 5x^3 + 1$

This function is a cubic function. Cubic functions have a range of all real numbers. For any y value, you can find an x^* value that will produce it. This function is onto.

- C. $F(x) = |x - 1|$

- This function represents the absolute value of $(x-1)$. The absolute value function always outputs non-negative values. It will never produce negative outputs. Not onto.

- D. $F(x) = \sqrt{x^2 + 1}$

- The square root of $(x^2 + 1)$ is always greater than or equal to 1. This function will never produce output values less than 1. Not onto.

52. Which one of the following Pairs of functions is an inverse of each other in their respective domains

- A. $F(x) = \sqrt{x + 3}$ and $g(x) = x^2 - 9$
- B. $f(x) = x^5$ and $g(x) = 1/(x^5)$
- C. $f(x) = x^3 - 1$ and $g(x) = \sqrt[3]{x + 1}$
- D. $f(x) = \frac{x+1}{x-1}$ And $g(x) = \frac{x-1}{x+1}$

Answer; C

Let's test each pair:

- A. $F(x) = \sqrt{x + 3}$ and $g(x) = x^2 - 9$
 - $f(g(x)) = \sqrt{(x^2 - 9) + 3} = \sqrt{x^2 - 6} \neq x$
 - $g(f(x)) = (\sqrt{x + 3})^2 - 9 = x + 3 - 9 = x - 6 \neq x$
 - Not inverses

- B. $F(x) = x^5$ and $g(x) = 1/(x^5)$
 - $f(g(x)) = (1/(x^5))^5 = 1/x^{25} \neq x$
 - $g(f(x)) = 1/(x^5)^5 = 1/x^{25} \neq x$
 - Not inverses

Understanding Inverse Functions

Two functions, $f(x)$ and $g(x)$, are inverses of each other if:

- $f(g(x)) = x$ for all x in the domain of $g(x)$.
- $g(f(x)) = x$ for all x in the domain of $f(x)$.

52. Which one of the following Pairs of functions is an inverse of each other in their respective domains

A. $F(x) = \sqrt{x + 3}$ and $g(x) = x^2 - 9$

B. $f(x) = x^5$ and $g(x) = 1/(x^5)$

C. $f(x) = x^3 - 1$ and $g(x) = \sqrt[3]{x + 1}$

D. $f(x) = \frac{x+1}{x-1}$ And $g(x) = \frac{x-1}{x+1}$

C. $F(x) = x^3 - 1$ and $g(x) = \sqrt[3]{x + 1}$

- $f(g(x)) = (\sqrt[3]{x + 1})^3 - 1 = x + 1 - 1 = x$
- $g(f(x)) = \sqrt[3]{(x^3 - 1) + 1} = \sqrt[3]{x^3} = x$
- These are inverses!

D. $F(x) = (x + 1)/(x - 1)$ And $g(x) = (x - 1)/(x + 1)$

- $f(g(x)) = ((x - 1)/(x + 1) + 1) / ((x - 1)/(x + 1) - 1) = ((x - 1) + (x + 1)) / ((x - 1) - (x + 1)) = 2x / 0$ (undefined)
- Not inverses

Conclusion

The only pair of functions that are inverses of each other is C. $F(x) = x^3 - 1$ and $g(x) = \sqrt[3]{x + 1}$.

CHAPTER ONE -EUEE MATHS QUESTIONS

2016E.C

The shaded region in the following figure is the graph of a relation R

Which one of the following is the domain and range of R respectively

- A. $(-\infty, -1/2]$
- B. R and $(-\infty, -1/2)$
- C. R and $(-\infty, -1/2]$
- D. $(-\infty, -1/2)$ and R

Answer ;A

1. Find the Intersection Point

• Solve the system of equations:

$$* x - y + 1 = 0$$

$$* x + y = 0$$

• Adding the equations together, we get:

$$* 2x + 1 = 0$$

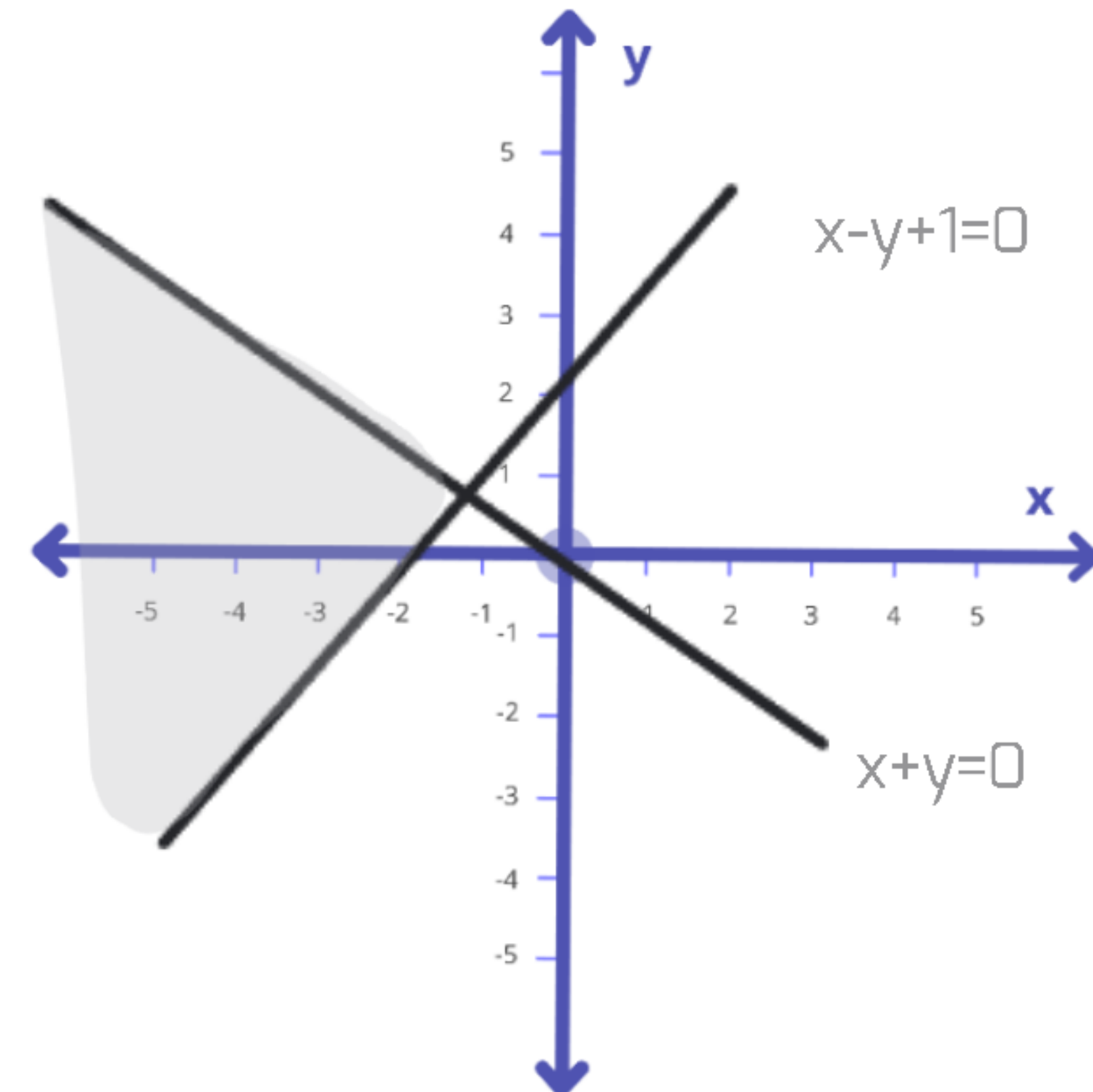
$$* x = -1/2$$

• Substitute $x = -1/2$ into either equation to find y:

$$* -1/2 + y = 0$$

$$* y = 1/2$$

• The intersection point is $(-1/2, 1/2)$



CHAPTER ONE -EUEE MATHS QUESTIONS

2016E.C

The shaded region in the following figure is the graph of a relation R

Which one of the following is the domain and range of R respectively

- A. $(-\infty, -1/2]$
- B. $\mathbb{R}$ and $(-\infty, -1/2)$
- C. $\mathbb{R}$ and $(-\infty, -1/2]$
- D. $(-\infty, -1/2)$ and $\mathbb{R}$

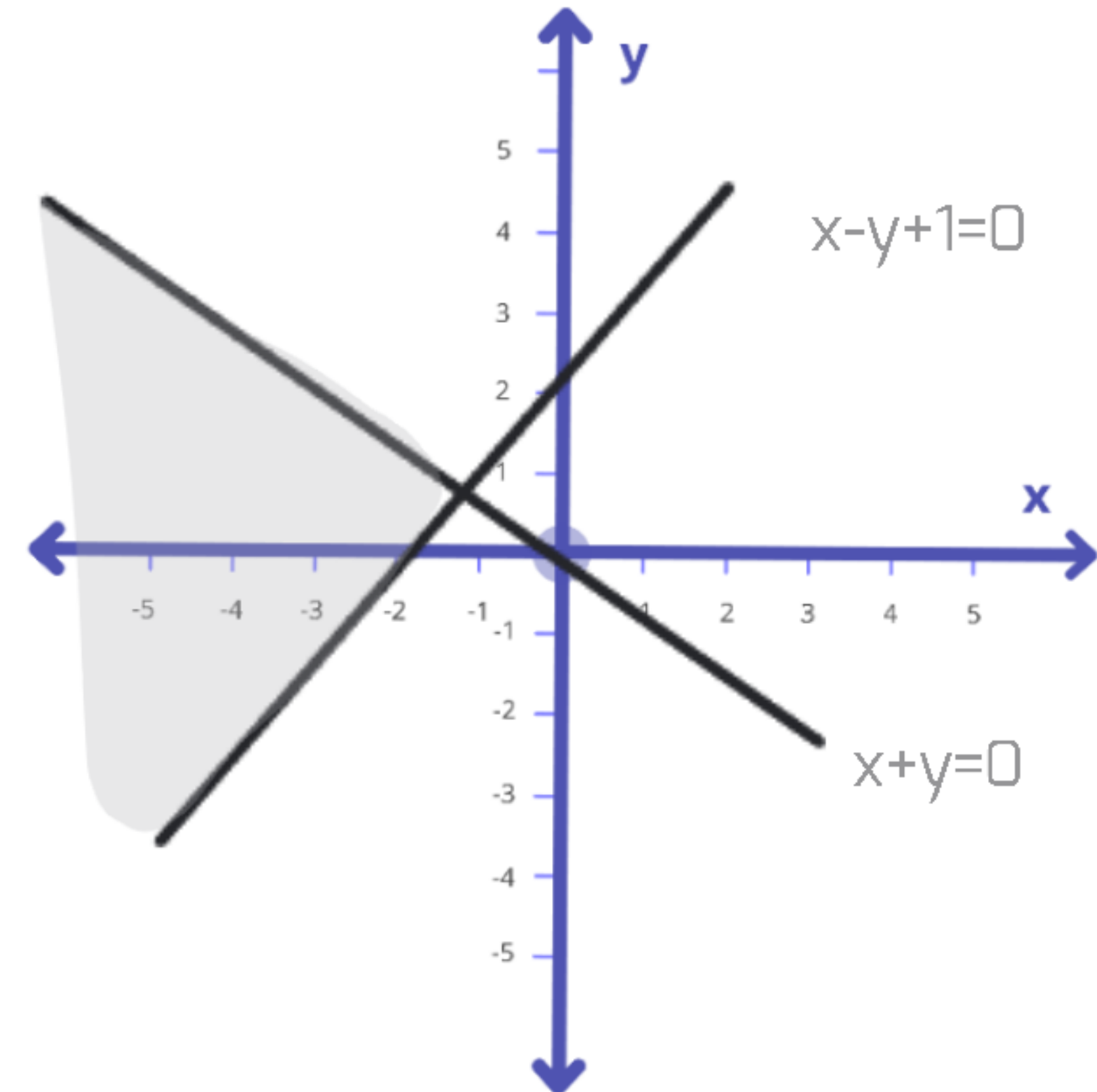
1. Domain:

- The shaded region extends infinitely to the left of the intersection point, including the point itself.
- Domain: $(-\infty, -1/2]$

2. Range:

- The shaded region extends infinitely upwards and downwards, including the intersection point.
- Range: $\mathbb{R}$ (all real numbers)

Therefore, the correct answer is A. $(-\infty, -1/2]$ and $\mathbb{R}$



THE END

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