

NDA 1 2025

LIVE

MATHS

INEQUALITIES

CLASS 1

NAVJYOTI SIR

SSBCrack
CLAMS

Crack
EXAMS



26 Sep 2024 Live Classes Schedule

8:00AM	26 SEP 2024 DAILY CURRENT AFFAIRS	RUBY MA'AM
9:00AM	26 SEP 2024 DAILY DEFENCE UPDATES	DIVYANSHU SIR

NDA 1 2025 LIVE CLASSES

11:30AM	GK - CLIMATOLOGY	RUBY MA'AM
1:00PM	BIOLOGY - HUMAN BODY - CLASS 3	SHIVANGI MA'AM
4:00PM	MATHS - INEQUALITIES - CLASS 1	NAVJYOTI SIR
5:30PM	ENGLISH - PARTS OF SPEECH - CLASS 2	ANURADHA MA'AM

CDS 1 2025 LIVE CLASSES

11:30AM	GK - CLIMATOLOGY	RUBY MA'AM
1:00PM	BIOLOGY - HUMAN BODY - CLASS 3	SHIVANGI MA'AM
2:30PM	MATHS - INEQUALITIES - CLASS 1	NAVJYOTI SIR
5:30PM	ENGLISH - PARTS OF SPEECH - CLASS 2	ANURADHA MA'AM

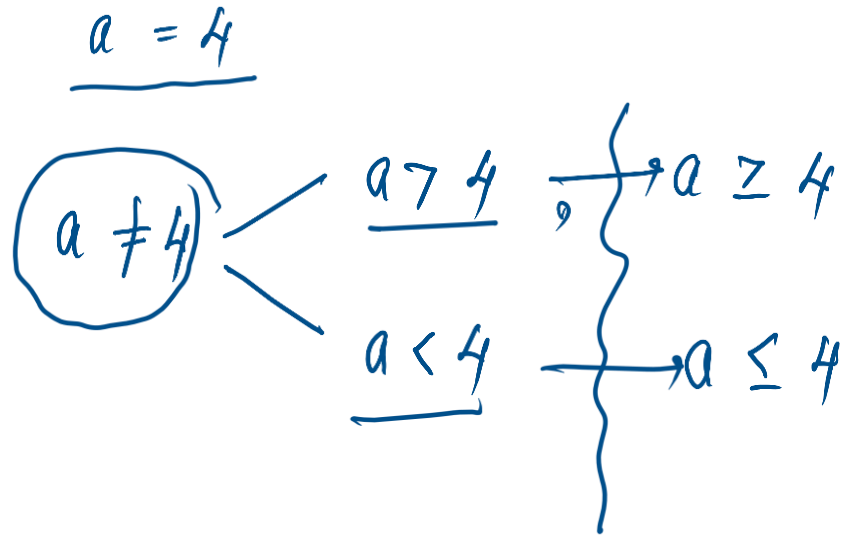
AFCAT 1 2025 LIVE CLASSES

10:00AM	REASONING - VENN DIAGRAMS	RUBY MA'AM
2:30PM	MATHS - PROFIT & LOSS - CLASS 1	NAVJYOTI SIR
4:00PM	STATIC GK - KNOW YOUR ARMED FORCES	DIVYANSHU SIR
5:30PM	ENGLISH - PARTS OF SPEECH - CLASS 2	ANURADHA MA'AM



INEQUALITIES

Any statement involving the symbols ' $>$ ', ' $<$ ', ' \geq ' or ' \leq ' is called an inequality. / *inequation*.



PROPERTIES

- (i) Sign of inequality does not change when equal numbers added to (or subtracted from) both sides of an inequality. ✓

$$\begin{array}{ccc}
 4 & > & 3 \\
 & = & \\
 4 + 5 & & 3 + 5 \\
 9 & > & 8
 \end{array}$$

- (ii) Sign of inequality does not change when both sides of an inequality can be multiplied (or divided) by the same positive number. But when both sides are multiplied or divided by a negative number, then the sign of inequality is reversed.

$$\begin{array}{ccc}
 2 < 6 & & 2 < 6 \\
 \downarrow \times 3 & & \downarrow \times -1 \\
 6 < 18 & & -2 > -6
 \end{array}$$

sign changed

PROPERTIES

- If $a > b, b > c$ then $a > c$. ✓
- If $a > b$, then $a + m > b + m$. ✓
- If $a > b$ then $am > bm$ for $m > 0$ and $am < bm$ for $m < 0$.
- If $a > b > 0$ then $\frac{1}{a} < \frac{1}{b}$

$$\textcircled{1} \quad a > b \quad b > c \quad | \quad 6 > 4 \quad 4 > 3 \quad \Rightarrow \quad \underline{6 > 3}$$

$$\textcircled{2} \quad \checkmark$$

$$\textcircled{3} \quad \checkmark$$

$$\textcircled{4} \quad 2 < 3 \quad \xrightarrow{\text{sign changed}} \quad \frac{1}{2} > \frac{1}{3}$$

$(0.5) \qquad (0.33)$

PROPERTIES

- If $a_1 > b_1, a_2 > b_2, \dots, a_n > b_n$ then
 $a_1 + a_2 + \dots + a_n > b_1 + b_2 + \dots + b_n$ for all
 positive number a 's and b 's.
- If $a_1 > b_1, a_2 > b_2, \dots, a_n > b_n$ then
 $a_1 a_2 \dots a_n > b_1 b_2 \dots b_n$ for all positive number
 a 's and b 's.

$$\begin{array}{c} \curvearrowright \\ \left. \begin{array}{ccc} 3 & > & 2 \\ 5 & > & 4 \\ 7 & > & 6 \end{array} \right\} \\ \checkmark \underline{15} > \underline{12} \checkmark \end{array}$$

$$3 \times 5 \times 7 \quad 2 \times 4 \times 6$$

$$\boxed{135 > 48}$$

PROPERTIES

- ① • If $a > b > 0$ and $n > 0$ then $a^n > b^n$ and $a^{1/n} > b^{1/n}$
(Since n is positive therefore $1/n$ is also positive)
- ② • If $x > y > 0$ and $a > 1$ then $a^x > a^y$
- ③ • If $x > y > 0$ and $0 < a < 1$ then $a^x < a^y$

① $3 > 2$ $n = 2$

3^2	2^2	$3^{\frac{1}{2}}$	$2^{\frac{1}{2}}$
9	4	$\sqrt{3}$	$\sqrt{2}$
$9 > 4$		(1.732)	(1.414)

② $a = 3$ $x = 5$, $y = 4$ $3^5 > 3^4$

③ $a = 0.5 = \frac{1}{2}$

$x = 3$ $y = 2$

$(0.5)^3 = (0.5)^2$

$(\frac{1}{8} < \frac{1}{4})$

SOLUTION OF A LINEAR INEQUALITY

The value(s) of the variable(s) which makes the inequality a true statement is called its **solutions**. The set of all solutions of an inequality is called the **solution set** of the inequality.

$$4x + 10 = 22$$

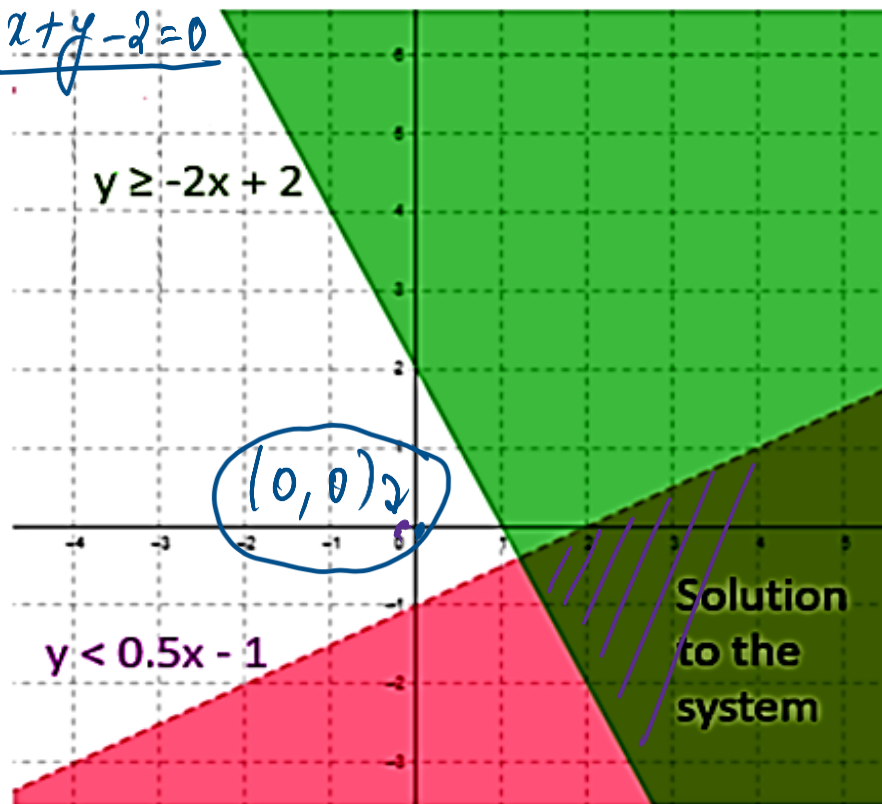
$$\underline{x = 3}$$

SOLUTION OF A SYSTEM OF LINEAR INEQUALITIES THROUGH GRAPHS

System of Linear Inequalities

Example:

- Graph and shade the solution to $y \geq -2x + 2$
- Graph and shade the solution to $y < 0.5x - 1$
- The overlapped shaded region is the solution to the system



$y \geq -2x + 2$ (solid line)

$0 \geq 2$ (not correct)

$y < 0.5x - 1$
(As a straight line)

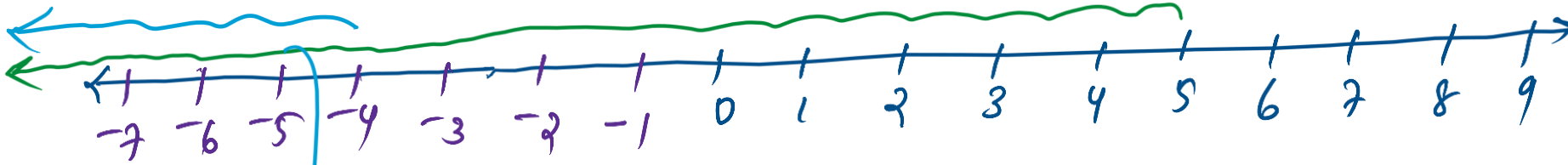
$y = 0.5x - 1$

$0.5x + y + 1 = 0$

$0 < -1$ (not correct)

$$\underline{x < 5}$$

$$\underline{x < -4}$$



$x < -4$ (common solution)

RESULTS

If $a, b \in \mathbf{R}$ and $b \neq 0$, then

(i) $ab > 0$ or $\frac{a}{b} > 0 \Rightarrow a$ and b are of the same

sign.

(ii) $ab < 0$ or $\frac{a}{b} < 0 \Rightarrow a$ and b are of opposite
sign.

$$a = 2 \quad b = 3$$

$$a = -2 \quad b = -3$$

$$\left. \begin{array}{l} ab = 6 > 0 \\ \frac{a}{b} = \frac{2}{3} > 0 \end{array} \right\} \text{if both are either} \\ \text{+ve or both are} \\ \text{-ve.}$$

$$a = -2 \quad b = 3$$

$$\left. \begin{array}{l} ab = -6 < 0 \\ \frac{a}{b} = -\frac{2}{3} < 0 \end{array} \right\} \text{if one of them} \\ \text{is -ve and other} \\ \text{is +ve.}$$

RESULTS

If a is any positive real number, i.e., $a > 0$, then

(i) $|x| < a \Leftrightarrow -a < x < a$

$|x| \leq a \Leftrightarrow -a \leq x \leq a$

(ii) $|x| > a \Leftrightarrow \underline{x < -a}$ or $\underline{x > a}$

$|x| \geq a \Leftrightarrow \underline{x \leq -a}$ or $\underline{x \geq a}$

$| -3 | = \underline{3}$

$| 3 | = \underline{3}$

(i) $\underline{|4|} < 7$
 → $\underline{-6 \text{ to } 6}$

(ii) $\underline{|9|} > 6$
 } +ve → $\underline{7, 8, 9}$ } $\underline{9 > 6}$
 } -ve → $\underline{-7, -8, -9}$ } $\underline{-9 < -6}$

QUESTION

Which one of the following values of x, y satisfies the in equation $2x + 3y \leq 6; x \geq 0, y \geq 0$? [NDA/NA 2007]

- (a) $x=0, y=3$ ✓ (b) $x=1, y=2$ ✓
(c) ✓ $x=1, y=1$ ✓ (d) $x=4, y=0$ ✓

$2x + 3y \leq 6$ $x \geq 0, y \geq 0$

(a) $2(0) + 3(3) = 9 \leq 6$ ✗

(b) $2(1) + 3(2) = 8 \leq 6$ ✗

(c) $2(1) + 3(1) = 5 \leq 6$ ✓

(d) $2(4) + 3(0) = 8 \leq 6$ ✗

wrong

QUESTION

Which one of the following values of x, y satisfies the in equation $2x + 3y \leq 6; x \geq 0, y \geq 0$? [NDA/NA 2007]

- (a) $x=0, y=3$ (b) $x=1, y=2$
(c) $x=1, y=1$ (d) $x=4, y=0$

ANSWER : (c)

QUESTION

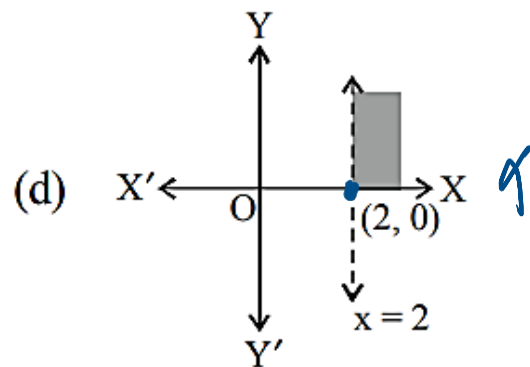
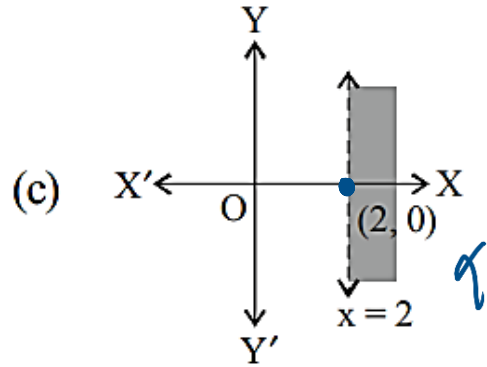
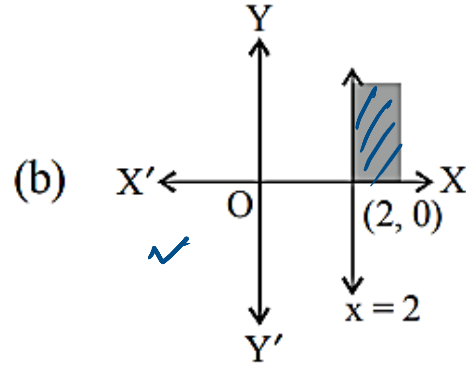
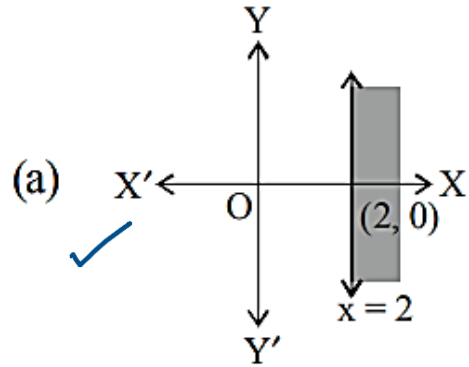
The graphical solution of $3x - 6 \geq 0$ is

$$3x - 6 \geq 0$$

$$3x \geq 6$$

$$x \geq 2$$

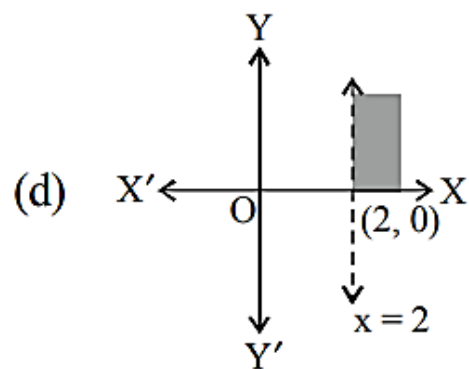
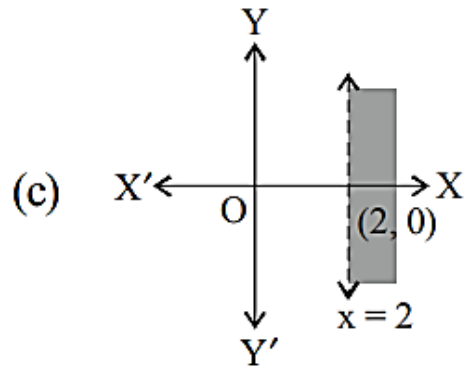
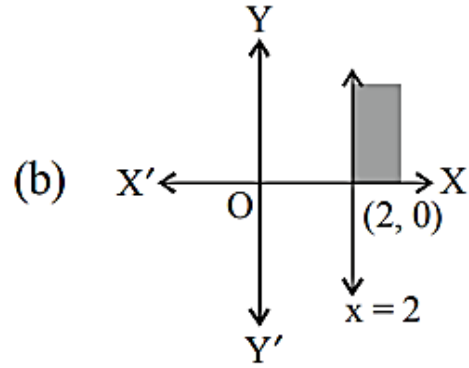
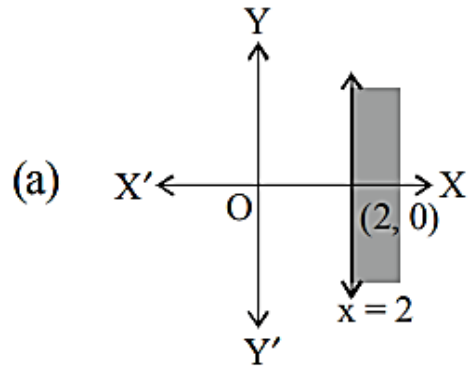
Solid line



QUESTION

The graphical solution of $3x - 6 \geq 0$ is

ANSWER : (a)



QUESTION

Which of the following is the solution set of linear inequalities $2(x - 1) < x + 5$ and $3(x + 2) > 2 - x$?

- (a) $(-1, 7]$
- (b) $[-1, 7)$
- (c) $(-1, 7)$ ✓
- (d) $[-1, 7]$

$$2(x - 1) < x + 5$$

$$2x - 2 < x + 5$$

$$2x - x < 5 + 2$$

$$\underline{x < 7}$$

$$\underline{(-1, 7)}$$

$$-1 < x < 7$$

$$3(x + 2) > 2 - x$$

$$3x + 6 > 2 - x$$

$$4x > -4$$

$$\frac{(4x)}{4} > \frac{-4}{4}$$

$$\underline{x > -1}$$

$$a \leq x \leq b$$

closed interval
[a, b]

$$a < x < b$$

$$(a, b)$$

open interval

$$\begin{array}{l|l} a \leq x < b & a < x \leq b \\ \underline{[a, b)} & (a, b] \end{array}$$

square bracket means a & b are included

round bracket means a & b are not included.

QUESTION

Which of the following is the solution set of linear inequalities $2(x - 1) < x + 5$ and $3(x + 2) > 2 - x$?

- (a) $(-1, 7]$ (b) $[-1, 7)$
(c) $(-1, 7)$ (d) $[-1, 7]$

ANSWER : (c)

QUESTION

What is the solution of $x \leq 4, y \geq 0$ and $x \leq -4, y \leq 0$?

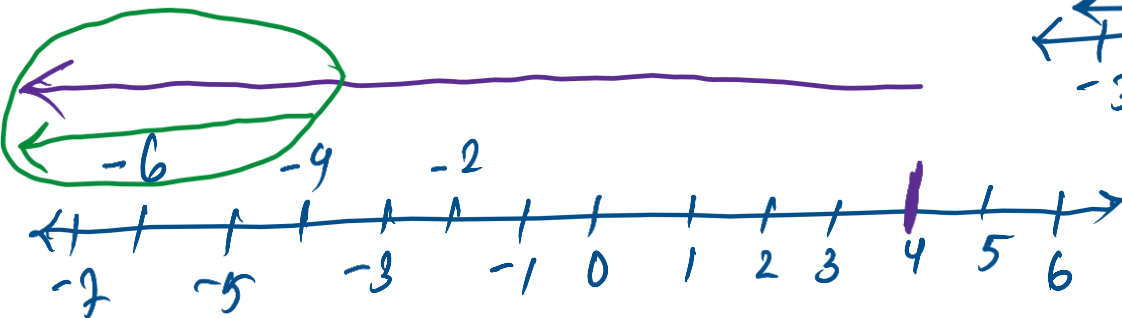
[NDA/NA 2019-II]

- (a) $x \geq -4, y \leq 0$ (b) $x \leq 4, y \geq 0$
 (c) $x \leq -4, y = 0$ (d) $x \geq -4, y = 0$

$x \leq 4 \quad y \geq 0 \quad x \leq -4 \quad y \leq 0$

$\left. \begin{array}{l} x \leq 4 \\ x \leq -4 \end{array} \right\} x \leq -4$

$\left. \begin{array}{l} y \geq 0 \\ y \leq 0 \end{array} \right\} y = 0$



QUESTION

What is the solution of $x \leq 4, y \geq 0$ and $x \leq -4, y \leq 0$?

[NDA/NA 2019-II]

- (a) $x \geq -4, y \leq 0$ (b) $x \leq 4, y \geq 0$
(c) $x \leq -4, y = 0$ (d) $x \geq -4, y = 0$

ANSWER : (c)

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LIVE

MATHS

INEQUALITIES

CLASS 2

NAVJYOTI SIR

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