وزارة التعليم العالي والبحث العلمي

جامعة الانبار

كلية الصيدلة

المرحلة الأولى

المحاضرة الأولى

مادة الرياضيات

Math & Biostatistics

أستاذة المادة

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1444هـ

2023م

Lecture 1: Intervals

Let $a, b \in R_a$

1- $\{x: x \in R, a < x < b\}$ it is called open interval (a, b)
2- $\{x: x \in R, a \leq x \leq b\}$ it is called closed interval $[a, b]$
3- $\{x: x \in R, a \leq x < b\}$ it is called half closed intervals from the left $[a, b)$
4- $\{x: x \in R, a < x \leq b\}$ it is called half closed intervals from the right $(a, b]$

Example for the intervals

1- $\{x: x \in R, 2 < x < 4\}$ & $(2,4)$
2- $\{x: x \in R, 1 \leq x \leq 5\}$ & $[1,5]$
3- $\{x: x \in R, x \geq 7\}$ & $[7, \infty]$
4- $\{x: x \in R, x < 2\}$ &$(-\infty, 2)$

Absolute value

$$|x| = \begin{Bmatrix} x: if\ x \geq 0 \\ -x : if\ x < 0 \end{Bmatrix}$$

Theory of Absolute value

1- $|ab| = |a|.|b|$
2- $\left|\frac{a}{b}\right| = \frac{|a|}{|b|}$
3- $|x| < a \Rightarrow -a < x < a$
4- $|x| > a \Rightarrow x > a\ \ or\ x < -a$

Example: - write the Intervals value to prove the x?

1- $|x-4|<2$

Sol :

$|x|<a \Rightarrow -a<x<a$

$-2<x-4<2 \Rightarrow -2+4<x<2+4$

$\because 2<x<6$

$Ss \quad (2,6)$

2- $|2x-7|>1$

$|x|>a \Rightarrow x>a$ $\quad$ $or\ x<-a$

$|2x-7|>1$ $\quad$ $or\ \ |2x-7|<-1$

$2x>8$ $\quad$ $or\ \ 2x<6$

$x>4$ $\quad$ or $x<3$

$Tp=\{(-\infty,3)\cup(4,\infty)\}$

Homework :

3- $\left|x+\frac{1}{2}\right|<\frac{3}{2}$

4- $|2x+3|<5$

Solution set of Inequalities: -

Inequality: - solve the inequality: -

1) $2(x+2) \leq x-5$

Solution: $2(x+2) \leq x-5$

First remove parenthesis.

$2x+4 \leq x-5$

Next add (-4) to each side

$2x+4-4 \geq x-5-4$

$2x \geq x-9$

$2x-x \geq -9$

$\therefore x \geq -9$

2) $3x - 4 = 7x + 8$

Solution:

$3x - 4 + 4 = 7x + 8 + 4$

$3x = 7x + 12$

$3x - 7x = 12$

$-4x = 12 \Longrightarrow x = \frac{12}{-4} = -3$

or (add - 4) $\frac{-4x}{-4} = \frac{12}{-4}$ $\therefore x = -3$

check the solve:

$3x - 4 = 7x + 8$

$3(-3) - 4 = 7(-3) + 8$

$-9 - 4 = -21 + 8$

$-13 = -13$

3) $-3x + 5 \leq -16$

$-3x \leq -21$

$\frac{-3x}{-3} \geq \frac{-21}{-3}$ Divide by -3, reverse in inequality

$\therefore x \geq 7$

4) $2x - 3 < 8$

Add $(+3)$ to each side $\therefore 2x - 3 + 3 < 8 + 3$

$2x < 11$

$\therefore x < \frac{11}{2}$

5) $-3x + 7 \leq 13$

$-3x \leq 6$ $\therefore x \geq -2$

Flip the sign after dividing by the (-3)

6) $3x - 8 < x - 2$

Solution: $3x - 8 + 8 < x - 2 + 8$ add $(+8)$ to the tap side

$3x < x + 6$

$3x - x < 6$ $\therefore 2x < 6$ dividing two outside $(+2)$

$\Longrightarrow x < 3$

$Tp = \{x: x \in R, x < 3\}$

7) $7 \leq 2 - 5x < 9$

Solu:

$2 - 5x \geq 7$ and $2 - 5x < 9$

$-5x \geq 7 - 2$ and $-5x < 9 - 2$

$-5x \geq 5$ and $-5x < +7 \Rightarrow -5x < +7$

$\therefore x \geq -1$ $\therefore x < \frac{-7}{5}$

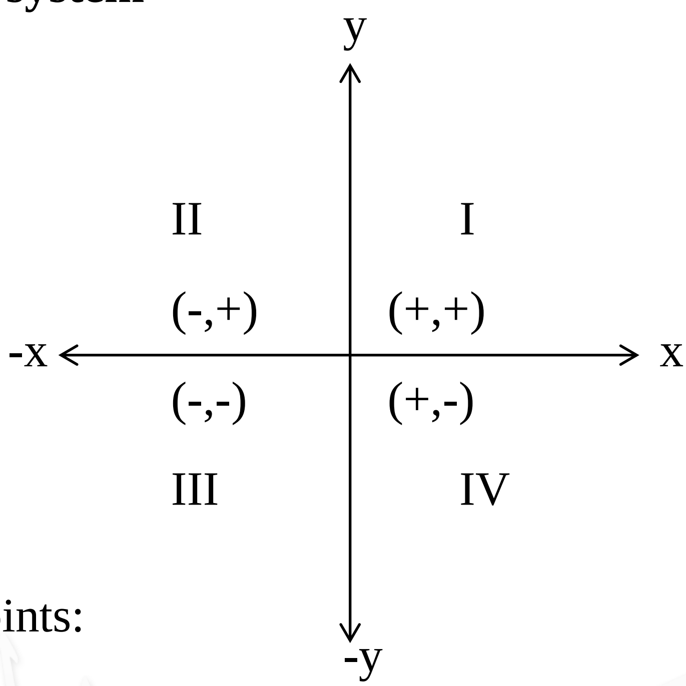
$Tp = \{x: x \in R, -1 \leq x < -\frac{7}{5}\}$

Homework:

1- $-5 < 2x + 6 < 4$
2- $x^2 - 5x + 6 < 0$

" Coordinate Planer "

1) Intersecting coordinate system



2) Distance between two points:

$p_1(x_1 y_1)$

$p_2\ (x_2, y_2)$

$d = \sqrt{(x_2 - x)^2 + (y_2 - y_1)^2}$

3) Intercept point: - The point at which the line intersects the two axes is called the point of intersection.

Example 1/ Find the intercept point straight $3x + 2y = 6$?

Solution: -

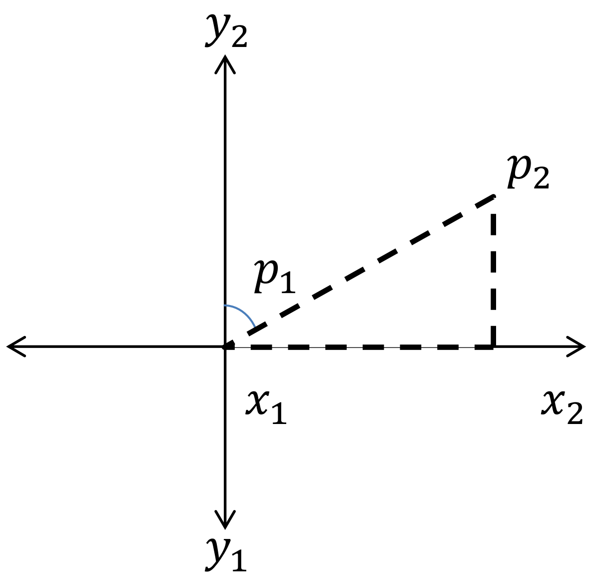
$y = 0 \Longrightarrow 3x = 6 \ \Longrightarrow x = 2$

Point 1 (2,0)

$x = 0 \Longrightarrow 2y = 6 \ \Longrightarrow y = 3$

Point 2 (0,3)

4) Slope of a Line



If the $p_1(x_1, y_1)$, $p_2(x_2, y_2)$

Then: $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$

5) Equation of a straight Line

A-Slope point equation $\Longrightarrow y - y_1 = m(x - x_1)$

B-1-slope intercept equation $y = mx + b$

C-In the event that the Line passes through the origin point $y = mx$

- If the $slope_m = 1$ than $y = x$
- If the $slope_m = -1$ than $y = -x$

D-If there is a point and equation, and a line is parallel to the line then:. $m = \frac{(-x)\quad factor}{y\quad\ factor}$

Example: Find the distance between point (2,1)

to the straight the equation $y = x + 2$

Solution: -

$x = 0 \Rightarrow y = 2 \qquad \therefore point_1\ (0,2)$

$y = 0 \Rightarrow x = -2 \qquad \therefore point_2\ (-2,0)$

To find the strength of functions L_2

$y = x + 2$

$y - x - 2 = 0$

$m = \frac{\Delta y}{\Delta x} \Rightarrow m_1 = 1$

$\therefore m_2 = -1 \Rightarrow y - y_1 = m_2(x - x_1)$

$$y - 1 = -1(x - 2)$$

$y - 1 = -x + 2$

$\therefore y = -x + 3 \ldots\ldots L2 \ldots\ldots (2)$

$x + 2 = -x + 3$

$2x = 1 \therefore x = \frac{1}{2}$

$y = \frac{1}{2} + 2 \ \therefore y = \frac{5}{2}$

$point\ \left(\frac{1}{2}, \frac{5}{2}\right)$

$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

$= \sqrt{\left(2 - \frac{1}{2}\right)^2 + \left(1 - \frac{5}{2}\right)^2} \Rightarrow \sqrt{\left(\frac{9}{4}\right) + \left(\frac{9}{4}\right)}$

$$= \sqrt{\frac{18}{2}} = \frac{3\sqrt{2}}{2} = \frac{3}{\sqrt{2}}$$

Example 2// Find the equation straight pass through including two the point $(4, 9), (2, 3)$

Solution:

$$m = \frac{\Delta y}{\Delta x} = \frac{y_2 - y_1}{x_2 - x_1} \Longrightarrow \frac{3-9}{2-4} = 3$$

$$y - y_1 = m(x - x_1)$$

$y - 9 = 3(x - 4) \Longrightarrow$ This is straight equation

Example 3// Find the equation straight passing through the point $(2, 3)$ and the slope $\frac{-3}{2}$?

Solution:

$$y - y_1 = m(x - x_1)$$

$$y - 3 = \frac{-3}{2}(x - 2)$$