المادة: الرياضيات

المرحلة: الاولى

المحاضر: م.م رياض حامد

2021-2022

Lecture (2)

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Example 8: Find the line L1 passes through the point P(1,2) and parallel the line L2: x + 2y = 3.

SOL:

L1: P(1,2) M=???

L2: x + 2y = 3.

L1 parallel the line L2 so that m1=m2.

x + 2y = 3

y = -1/2 X + 3/2

then m2= -1/2 so that m1=-1/2

$$\mathbf{y = y_1 + m(x - x_1)}$$

$$\mathbf{y = 2 + \left(-\frac{1}{2}\right)(x - 1)}$$

$$\mathbf{y = 2 + \left(-\frac{1}{2}x + \frac{1}{2}\right)}$$

$$\mathbf{y = -\frac{1}{2}x + \frac{5}{2}}$$

==

H.W:

Find the line L1 passes through the point (-2,2) and perpendicular to the line L2 : 2x + y = 4.

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The Distance from a Point to a Line:

The distance (d) between the line L is Ax + By + C= 0 and the point $P(x_1, y_1)$:

$$d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}}$$

Example 9: Find the distance from the point P(2,1) to the line y = x + 2

SOL:

1- put the line in the general form Ax + By + C= 0

y = x + 2

-x+y-2=0

so that A=-1 ,B=1 , C=-2 , $x_1 = 2$, $y_1 = 1$

$$d = \frac{|Ax_1 + By_1 + C|}{\sqrt{A^2 + B^2}} = \frac{|-1 * (2) + 1 * (1) + (-2)|}{\sqrt{(-1)^2 + (1)^2}}$$

$$= \frac{|-3|}{\sqrt{2}} = \frac{3}{\sqrt{2}}.$$

================================

H.W:

1-Find the distance from the point P(3,2) to the line y = 3x – 4.

2-Find the distance from the point P(-4,1) to the line y = -2x +1.

3- Find the following:

- The slope of the line 2x+3y-5=0?
- The distance from the above line to the point P(-1,0).

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Lecture (2)

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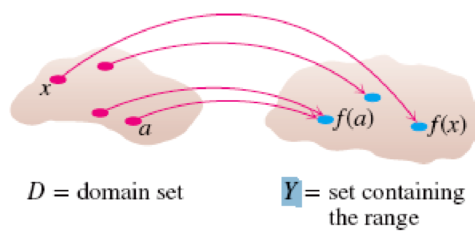
Functions الدوال

DEFINITION: Function

A **function** is a set D (domain) to a set R (range) is a rule that assigns to unique (single) element f(x)∈R to each element x∈D.

$$\boldsymbol{F}: \boldsymbol{X} \rightarrow \boldsymbol{F}(\boldsymbol{X}) \text{ it means that f sends x to f(x)=y}$$



- **The set of x is called the "Domain" of the function (D_f).**
- **The set of y is called the "Range" of the function (Rf).**

Domain (Df): is the set of all possible inputs (x-values).
Range (Rf): is the set of all possible outputs (y-values).

Note: To find Domain (Df) and the Range (Rf) the following points must be noticed:

1- The denominator in a function must not equal zero (never divide by zero).
2- The values under even roots must be positive.

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Examples: Find the Domain (Df) and Range (Rf) of the following functions:

1- $y = f(x) = \frac{1}{x}$

Sol: denominator must not equal zero

$$x \neq 0$$

✓ Df =R/{0}

To find Rf : we must convert the function from y=f(x) into x=f(y).

$$y = \frac{1}{x} \quad \rightarrow \quad x = \frac{1}{y}$$

✓ Rf =R/{0}.

=====================================

2- $y = \sqrt{3 - X}$

$$3 - X \geq 0 \rightarrow \quad 3 \geq X$$

✓ $Df = \{x \in R \ / \ x \leq 3\}$

To find Rf : we must convert the function from y=f(x) into x=f(y).

$$y = \sqrt{3 - x}$$
$$y^2 = 3 - x$$
$$x = 3 - y^2$$

✓ $Rf = \{y \in R\}$.

===

H.W: Find the Domain (Df) and Range (Rf) of the following functions:

1- $y = \frac{1}{x^2}$

2- $y = 2x^2$

3- $y = \sqrt{5 - 2X}$

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Sums, Difference, Product and Quotients of Functions:

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Definition: If F and G are functions, then we define the functions

- ✓ Sum → (F+G)(x)= F(x)+G(x)
- ✓ Difference → (F - G)(x)= F(x) - G(x)
- ✓ Product → (F * G)(x)= F(x) *G(x)
- ✓ Quotient → (F / G)(x)= F(x) /G(x) , where $g(x) \neq 0$

Example 1: Combining Functions Algebraically

The function defined by the formulas

f (x) = $\sqrt{x}$ **and g(x) =** $\sqrt{1-x}$

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

H.W: Combining Functions Algebraically The function defined by the formulas **f (x) = 3x and g(x) =** $1-x^2$.