1.4 Graphs

If (f) is a function with domain (D), its graph consists of points in Cartesian plane whose coordinate are the input – output pairs for (f).
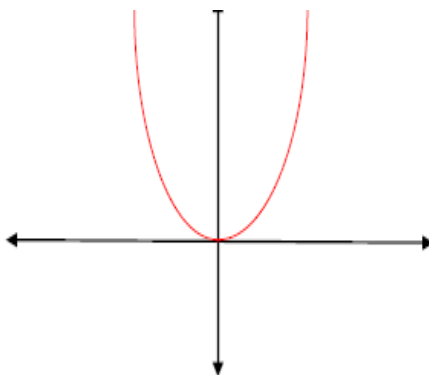
Example 1: Graph the function $y=x^2$

Solution//

1. Domain function =real number (R)

2. with x-axis →y=0→x^2=0→x=0→ (0,0)

With y-axis →x=0→y=0→(0,0)

x	y= (x^2)
0	0
1	1
2	4
-1	1
-2	4

Example 2: graph the function $y=\dfrac{2+3X}{4+2X}$

Solution//

1. Domain [4+2x=0→ $x = -2$]

Domain function=R except $\{-2\}$

2.with y- axis, x=0→ y=$\dfrac{2+0}{4+0}$

y=0.5, (0,0.5)

with x- axis, y=0→ $0=\frac{2+3X}{4+2X}$

$2 + 3x = 0 \rightarrow x = -2/3.\,(-2/3.0)$

3. Vertical,   4+2x=0→x=-2

4. Horizontal, y=3/2

5.

x	$y=\frac{2+3X}{4+2X}$
0	0.5
1	5/6
2	1
-1	-0.5
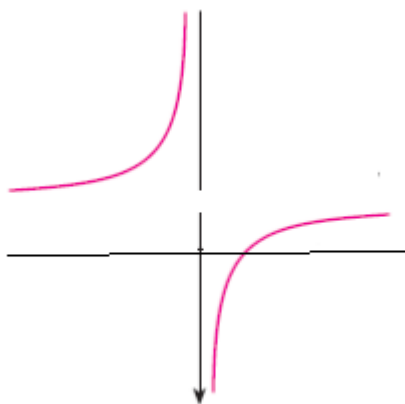
Exercise: graph the function   **y=(x+1)²**

1.5 Function; Domain and range

Domain represents values of (x)

Range represents values of (y)

Example1: Find the domain and range of y=x²+1

Solution//

Domain function=R or $-\infty \le x \le +\infty$

y=x²+1→x=$\pm\sqrt{y-1}$

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Range function $=y \geq 1$

Example 2: Find the domain and range of $y=\frac{2x}{x-1}$

Solution//

X-1=0→x=1→domain function=R except {1}

$$y=\frac{2x}{x-1} \rightarrow yx-y=2x$$

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

$$y-2=0 \rightarrow y = 2$$

Range function=R except {2}

Example 3: Find the domain and range of $y=\frac{1}{x+1} - \frac{1}{x-1}$

Solution//

X+1=0→x=-1

X-1=0→ $x = 1$

Domain function=R except {-1,1}

$y=\frac{1}{x+1} - \frac{1}{x-1}$

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

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

$yx^2 - y = -2$

$\rightarrow x = \frac{\sqrt{-2+y}}{\sqrt{y}}$

y> 0 *and* $y \geq 2$

Range function= y> 0 $\cup$ $y \geq 2$

Example 4: Find the domain and range of y=$\sqrt{\dfrac{x-1}{x+2}}$

Solution/

x-1$\geq 0 \rightarrow x \geq 1$

x+2$\geq 0 \rightarrow x > -2$

Domain function=\{x:x$\geq$ 1\}$\cap$\{x:x> -2\}

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

$$Y^2=\frac{x-1}{x+2} \rightarrow xy^2 + 2y^2 = x - 1$$

$$\rightarrow xy^2 - x = -1 - 2y^2$$

$$\rightarrow x = \frac{-1-2y^2}{y^2-1} \rightarrow y^2 - 1 = 0 \rightarrow y = \pm 1$$

Range function=R except \{+1. −1\}

Exercise: Find the domain and range of y=$\dfrac{1}{\sqrt{4-X^2}}$