**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=x2**

**Solution//**

**1. Domain function =real number (R)**

|  |  |
| --- | --- |
| **x** | **y= (x2 )** |
| **0** | **0** |
| **1** | **1** |
| **2** | **4** |
| **-1** | **1** |
| **-2** | **4** |

**2. with x-axis →y=0→x2=0→x=0→ (0,0)**

 **With y-axis →x=0→y=0→(0,0) **

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

**Solution//**

**1. Domain [4+2x=0**$\rightarrow x=-2]$

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

**2.with y- axis, x=0**$\rightarrow $ **y=**$\frac{2+0}{4+0}$

**y=0.5, (0,0.5)**

**with x- axis, y=0**$\rightarrow $ **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** |

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**H.W. Example: graph the function y=(x+1)2**

**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 \leq x\leq +\infty $

**y=x2+1**$\rightarrow $**x=**$\pm \sqrt{y-1}$

**Range function =y**$\geq $**1**

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

**Solution//**

**X-1=0**$\rightarrow $**x=1→domain function=R except {1}**

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

**Domain function=R except {-1,1}**

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

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

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

**y**$x^{2}-y=-2$

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

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

**Range function= y**$>0 ∪ y\geq 2$

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

**Solution/**

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

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

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

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

**Y2**$=\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 {+**$1.-1$**}**

**H.W. Example: Find the domain and range of y=**$\frac{1}{\sqrt{4-X^{2}}}$