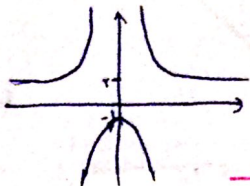


1. ا) $y = \frac{\ln|+1|}{\ln|-r|} \rightarrow$  $\Rightarrow R_f = \mathbb{R} - \left[-\frac{1}{r}, 1\right]$

ا. - $\frac{\ln|+1|}{\ln|-r|}$
A. $\frac{\ln|+1|}{\ln|-r|}$

ب) $y = \frac{n^r+1}{\ln 1} = \ln 1 + \frac{1}{\ln 1} \rightarrow R_f = [1, +\infty)$

2. $y = \frac{n^r+n-r}{n+r} \rightarrow n^r+n-r = y(n+r) \rightarrow n^r+(r-y)n+(-r-ry) = 0$

$2. n = \frac{y+r \pm \sqrt{(r-y)^2+4y+4}}{2} \rightarrow (r-y)^2+4y+4 \geq 0 \rightarrow y^r+r-4y+4y+4 \geq 0$

$2. y^r+4y+4 \geq 0 \rightarrow (y+2)(y+2) \geq 0 \rightarrow R_f = \mathbb{R} - (-2, -2)$

3. $f(n) = \frac{n^r-n+\frac{1}{r}}{n^r-n+1} \rightarrow D_f = \mathbb{R} \rightarrow n^r-n+\frac{1}{r} = y(n^r-n+1) \rightarrow (y-1)n^r+(1-y)n+(y-\frac{1}{r}) = 0$

$\rightarrow n = \frac{y-1 \pm \sqrt{(1-y)^2-4(y-\frac{1}{r})(y-\frac{1}{r})}}{2(y-1)} \rightarrow y^r-ry+1-4y^r+4y-1 \geq 0 \rightarrow -3y^r+4y \geq 0 \rightarrow y^r-y \leq 0 \rightarrow \frac{y^r-y}{y^r-y} \rightarrow y = [0, 1]$

4. ا) $y = \sqrt{-n^r+fn-1} \rightarrow -n^r+fn-1 \leq -\frac{14-f}{f} \rightarrow \sqrt{-n^r+fn-1} \leq \sqrt{\frac{14-f}{f}} \rightarrow R_f = [0, \sqrt{\frac{14-f}{f}}]$

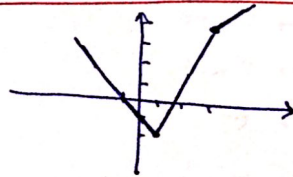
ب) $y = \sqrt[n^r-1]{n} \rightarrow n^r-1n \geq -\frac{4f}{1} \rightarrow R_f = [-1, +\infty)$

5. ا) $y = \log(\underbrace{n^r-n+1}_{\mathbb{R}}) \rightarrow R_y = \mathbb{R}$

ب) $y = \log_r\left(\frac{n^r+1}{n}\right) \rightarrow \frac{n^r+1}{n} = n + \frac{1}{n} \rightarrow R = \underbrace{(-\infty, -r]}_{\text{log}_r x} \cup [r, +\infty)$

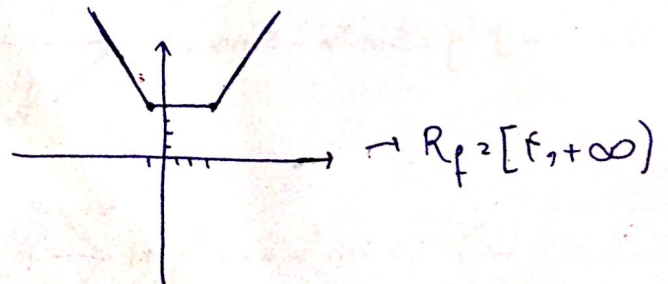
$\rightarrow \log_r([r, +\infty)) = [1, +\infty) \rightarrow R_y = [1, +\infty)$

6. ا) $y = |n-r| - |n-r| \begin{cases} n+1; & r \leq n \\ rn-a; & 1 \leq n \leq r \\ -n-1; & x \leq 1 \end{cases}$
 $\Rightarrow R_f = [-r, +\infty)$



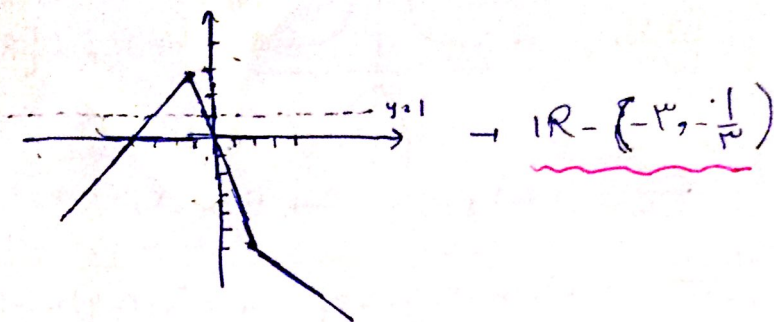
ب) $y = |n-r| + |n+1|$

$2. \text{log}_r \rightarrow \begin{cases} -rn+r; & x \leq -1 \\ r; & -1 \leq x \leq r \\ rn-r; & r \leq x \end{cases}$



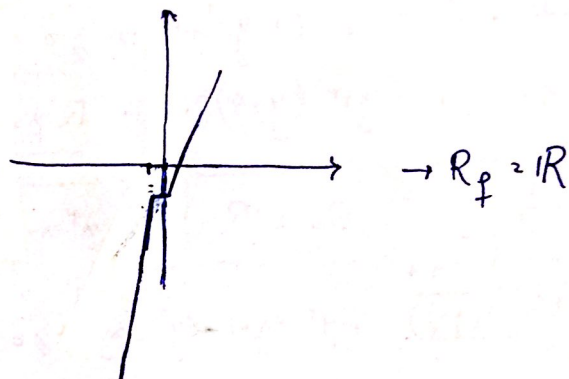
7- $|x-2| - |x+2| \leq 1$

$$\begin{cases} x-4 & ; x \leq -2 \\ -x & ; -2 \leq x \leq 2 \\ x+4 & ; x \geq 2 \end{cases}$$



8- $y = 2x - |2x+1| + |x|$

$$\begin{cases} x+1 & ; x \leq -\frac{1}{2} \\ -1 & ; -\frac{1}{2} \leq x \leq 0 \\ 2x-1 & ; 0 \leq x \end{cases}$$



9- ا) $y = [x] + [3-x]$

$[-2, -1) \rightarrow -2 + 5 = 3$

$[-1, 0) \rightarrow -1 + 4 = 3$

$[0, 1) \rightarrow 0 + 3 = 3$

$[1, 2) \rightarrow 1 + 2 = 3$

$x \rightarrow x + 1 = 3$

ب) $y = 3x - [x]$

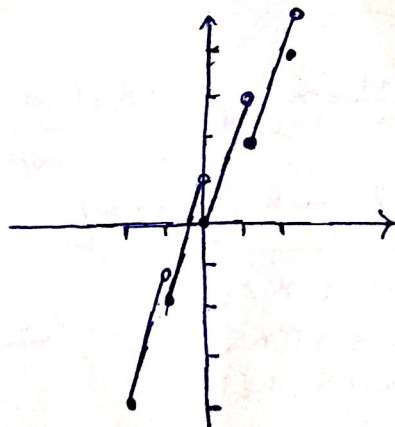
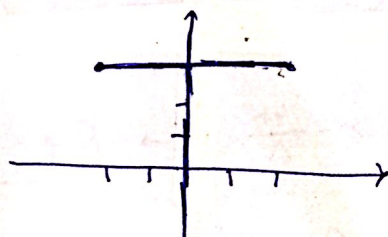
$[-2, -1) \rightarrow 3x + 2$

$[-1, 0) \rightarrow 3x + 1$

$[0, 1) \rightarrow 3x + 0$

$[1, 2) \rightarrow 3x - 1$

$x \rightarrow x$



10- ا) $y = \sin^2 x - \sin x + 1$

$\begin{cases} 1 \rightarrow 1 \\ -1 \rightarrow 3 \text{ max} \\ \frac{1}{2} \rightarrow \frac{3}{4} \text{ min} \end{cases}$

$\rightarrow R_f = [\frac{3}{4}, 3]$

ب) $y = \sin^2 x + \sin^2 x + 1$

$\begin{cases} 0 \rightarrow 1 \text{ min} \\ 1 \rightarrow 3 \text{ max} \\ -\frac{1}{2} \rightarrow 1 \end{cases}$

$\rightarrow R_f = [1, 3]$