

$$t > 0 \Rightarrow |n| = t \quad t \neq r$$

19,8

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1)

$$y = \frac{|n|+1}{|n|-r} \rightarrow \frac{t+1}{t-r} = \frac{t-r+r}{t-r} = 1 + \frac{r}{t-r}$$

(2)

$$\begin{aligned} \bullet \leq t < r &\xrightarrow{|n|=t} y < -\frac{1}{r} \rightarrow (-\infty, -\frac{1}{r}] \\ \bullet t > r &\rightarrow y > 1 \rightarrow y \neq 1 \rightarrow (1, +\infty) \end{aligned} \quad \cup \quad (-\infty, -\frac{1}{r}] \cup (1, +\infty)$$

$$y = \frac{n^r+1}{|n|} \quad n \neq 0 \rightarrow t = |n| \rightarrow \frac{t^r+1}{t} = t + \frac{1}{t} \xrightarrow{t=1} t + \frac{1}{t} \geq 2 \rightarrow [2, +\infty)$$

$$2) y = \frac{n^r + rn - r}{n+r} \quad n \neq -r \quad \begin{aligned} y(n+r) &= n^r + rn - r \\ ny + ry &= n^r + rn - r \rightarrow n^r + (r-y)n - (ry+r) = 0 \end{aligned} \quad (2)$$

$$\Delta = (r-y)^2 - 4(1)(-ry-r) \quad \Delta = (r-y)^2 + 4ry + 4r \rightarrow y^2 + 4ry + 4r \geq 0 \rightarrow (y+2)^2 - 4 \geq 0 \rightarrow (y+2)^2 \geq 4 \rightarrow y+2 \leq -2 \vee y+2 \geq 2 \rightarrow y \leq -4 \vee y \geq 0 \rightarrow (-\infty, -4] \cup [0, +\infty)$$

$$\leftarrow R_f, D_f \rightarrow \frac{n^r - n + \frac{1}{\varepsilon}}{n^r - n + 1} \rightarrow n^r - n + \frac{1}{\varepsilon} = (n - \frac{1}{r})^r \Rightarrow \frac{(n - \frac{1}{r})^r}{(n - \frac{1}{r})^r + \frac{r}{\varepsilon}} \rightarrow t = \frac{t^r}{t + \frac{r}{\varepsilon}} \quad (2)$$

$$D_f = (n - \frac{1}{r})^r + \frac{r}{\varepsilon} > 0 \rightarrow D_f = \mathbb{R} \checkmark$$

$$R_f = (n - \frac{1}{r})^r \geq 0 \rightarrow [0, +\infty)$$

$$\leftarrow y = \sqrt{-n^r + \varepsilon n - 1}$$

$$\begin{aligned} -n^r + \varepsilon n - 1 &= r - (n-r)^r \rightarrow \sqrt{r - (n-r)^r} \rightarrow \begin{aligned} r - (n-r)^r &\geq 0 \rightarrow r \leq (n-r)^r \rightarrow \sqrt{r} \leq n-r \rightarrow n \geq \sqrt{r} + r \\ r - (n-r)^r &\leq r \rightarrow (n-r)^r \geq 0 \rightarrow n-r \geq 0 \rightarrow n \geq r \end{aligned} \end{aligned} \quad (2)$$

$$\begin{aligned} 3) y &= \sqrt[r]{r n^r - n n} \rightarrow r n^r - n n = r(n^r - \varepsilon n) \\ r[(n-r)^r - \varepsilon] &\rightarrow (n-r)^r \geq 0 \rightarrow r[(n-r)^r - \varepsilon] \geq -n \\ n &\geq 0 \rightarrow [-n, +\infty) \xrightarrow{\sqrt[r]{}} R_f = [-r, +\infty) \end{aligned}$$

$$\Rightarrow \log(x^r - x + n)$$

$$x^r - x + n > 0 \rightarrow \mathbb{R} \checkmark \quad (2)$$

ب) $\log_r \left[\frac{x^2+1}{x} \right] \quad [\log_r, +\infty) \rightarrow \log_r = 1 \rightarrow [1, +\infty)$

4) $y = |2n-2| - |n-3| \xrightarrow{n \leq 1} |2n-2| = 2-2n \rightsquigarrow y = (2-2n) - (3-n)$
 $y = -n-1$
 $n=3 \rightarrow |n-3| = 3-n$

$n \leq 1 \rightarrow y > -2 \rightarrow (-2, +\infty)$

$1 \leq n < 3 \rightarrow 2n-2 - (3-n) \rightarrow 3n-5 \xrightarrow{n=2} 1$

$n=1 \rightarrow y = -2 \rightarrow [-2, 1]$
 $n > 3 \rightarrow y > 2 \rightarrow [2, +\infty)$

ب) $|n-3| + |n+1|$
 $\begin{array}{c|c|c} -1 & 3 & -1 \\ \hline 2-2n & & 2n-2 \\ \hline y \leq & & y \geq 2 \end{array} \Rightarrow [2, +\infty)$
 $R_y = [-2, +\infty)$

شکل ریشه‌های راحت و خوب (صفحه بعد)

7) $|n-2| - |2n+1| \leq 1$
 $\begin{array}{c|c|c} 2 & -1 & -1 \\ \hline 2n-2 & & -2n-1 \\ \hline y \leq 3 & & y \geq -5 \end{array}$

$\Rightarrow n \in (-\infty, -3] \cup [-\frac{1}{2}, +\infty)$

8) $y = 3n - |2n+1| + |n|$
 $\begin{array}{c|c|c} -1 & & -1 \\ \hline 2n-(-n-1) & & 2n-1 \\ \hline y = 3n+1 & & y = 2n-1 \end{array}$

$\begin{array}{c|c|c} -1 & & 1 \\ \hline 2n-(-n-1) & & 2n-1 \\ \hline y = 3n+1 & & y = 2n-1 \end{array}$

$\begin{cases} 3n+1 & n < -1 \\ 2n-1 & -1 \leq n < 0 \\ 3n-1 & n \geq 0 \end{cases} \quad \mathbb{R}$

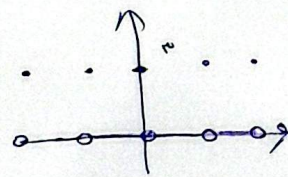
بسیار مهم ریشه‌های

سازار ریشه $[-2, 2]$

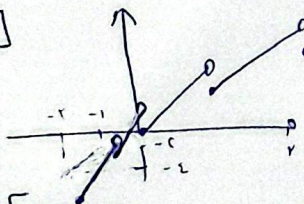
(1.5)

9) $y = [n] + [3-n]$

$R_y = \{2, 3\}$



ب) $3n - [n]$



با افت

$R_y = [-4, 5]$

1. ا) $\sin^2 \alpha - \sin \alpha + 1$

$[\frac{3}{4}, 2]$

$\sin \frac{1}{2} \rightarrow 1 - 1 + 1 = 1$

$\sin \frac{1}{2} \rightarrow 1 - (-1) + 1 = 3$

$\sin \frac{1}{2} \rightarrow -\frac{1}{2} - \frac{1}{2} + 1 = 0$

ب) $\sin^2 \alpha + \sin \alpha + 1$

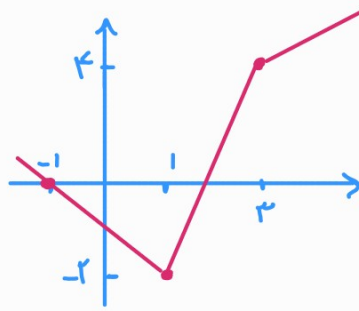
$[1, 3]$

$\sin \frac{1}{2} \rightarrow 1 + 1 + 1 = 3$

$\sin \frac{1}{2} \rightarrow -\frac{1}{2} - \frac{1}{2} + 1 = 0$

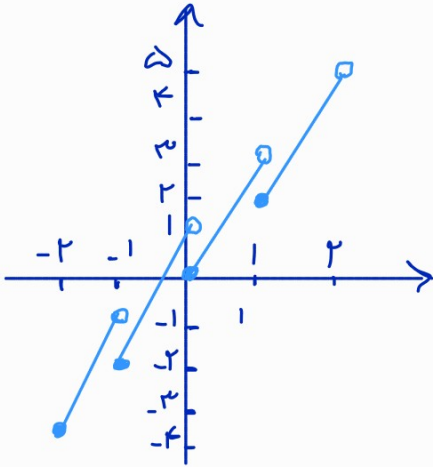
(2)

الف) $y = \begin{cases} x+1 & x \geq 3 \\ 3x-5 & 1 \leq x \leq 3 \\ -x-1 & x \leq 1 \end{cases}$



$\Rightarrow R_y = [-2, +\infty)$

-4



$R_y = [-2, \infty)$

-4