

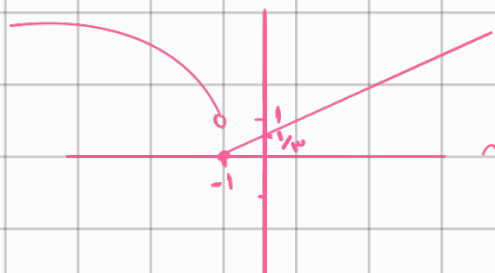
$$u = \begin{cases} yg^{-1} & y \geq 0 \rightarrow yg \geq 0 \rightarrow yg - 1 \geq -1 \leadsto u \geq -1 \\ -y^r & y > 1 \rightarrow y^r > 1 \rightarrow -y^r < -1 \leadsto u < -1 \end{cases}$$

در این تابع
در 1

$$u \geq -1 \rightarrow u = yg - 1 \rightarrow y = \frac{u+1}{g}$$

$$u \leq -1 \rightarrow u = -y^r \rightarrow y = \sqrt{-u} \rightarrow \text{نقطه } y=1 \text{ را به } u=-1 \text{ می‌رساند}$$

$$\leadsto g = \begin{cases} \frac{u+1}{g} & u \geq -1 \\ \sqrt{-u} & u < -1 \end{cases}$$



در این تابع

$$g(u) = \sqrt{\frac{u f(u-r)}{f(u)}} \leadsto u = 0, -r, \infty, r, -r, r, \infty$$

$$\leadsto \begin{array}{ccccccc} -r & -r & 0 & r & \infty & r & \\ -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & + \end{array}$$

$$D_g = (-r, -r] \cup [0, r) \cup [r, +\infty)$$

$$f(u) = \frac{r u^r - r u + r}{u^r - r u} = \frac{r u^r - r u + r}{u(u-r)(u+r)} \leadsto u = -r, 0, r$$

$$D_f = \mathbb{R} - \{0, -r, r\} \leadsto \text{در 0}$$

$$\begin{array}{ccc} -r & 0 & r \\ -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} \end{array}$$

$$D_{\sqrt{f}} = (-r, 0) \cup (r, +\infty)$$

$$g = \sqrt{\frac{u-r}{u^r - r u^r - 1}} \leadsto (u^r - r)(u^r + r)$$

$$\leadsto u = r^*, -r \leadsto \begin{array}{ccc} -r & r^* & \\ -\frac{r}{g} + \frac{r}{g} & -\frac{r}{g} + \frac{r}{g} & \end{array} \leadsto D = (-r, +\infty) - \{r\}$$

$$g = \frac{r u^r + 1}{r - r[-u]} \leadsto r - r[-u] \neq 0 \leadsto r[-u] \neq r \leadsto [-u] \neq r$$

$$[-u] = r \leadsto r \leq -u < r \leadsto -r < u \leq -r$$

$$D = \mathbb{R} - (-r, -r]$$

$$f(x) = \frac{\sqrt{x(x^2-1)}}{\sqrt{|x|+x}} \quad \leadsto x=0, \pm 1$$

دسته اول

$$x > 0 \rightarrow x$$

$$x \leq 0 \rightarrow 0 \leadsto \frac{0}{0}$$

مخرج صفر یا مخرج نامعین یا مخرج برای آنکه

مخرج صفر یا مخرج نامعین یا مخرج برای آنکه

$$\frac{1}{-} \quad \leadsto D = [1, +\infty)$$

دسته دوم

$$f(x) = \frac{\sqrt{|x-1|-x^2}}{|x|-1}$$

$$|x| \neq 1 \quad \textcircled{1}$$

$$\Delta < 0 \leadsto \text{مخرج صفر یا مخرج نامعین}$$

$$|x-1|-x^2 \geq 0 \leadsto x \leq 1 \leadsto -x^2+x-1 \geq 0 \rightarrow \text{مخرج صفر یا مخرج نامعین}$$

$$x \leq 1 \leadsto -x^2-x+2 \geq 0 \rightarrow x^2+x-2 \leq 0 \leadsto [-2, 1] \quad \textcircled{2}$$

$$(x-1)(x+2)$$

$$\begin{array}{c} -2 \quad 1 \\ + \quad - \quad + \end{array}$$

$$\textcircled{1} \cap \textcircled{2} \cap \textcircled{3} \leadsto D = [-2, 1) - \{-1\}$$

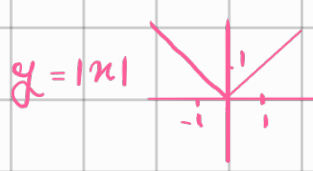
$$g_1 = \sqrt{(x-2)[x-3]} \leadsto \begin{array}{c} 2 \quad 3 \\ + \quad 0 \quad + \end{array} \leadsto D = [2, 3]$$

دسته اول

$$g_2 = \sqrt{|x-1|[x-3]} \leadsto \begin{array}{c} 1 \quad 3 \\ - \quad 0 \quad + \end{array} \leadsto D = [3, +\infty) \cup \{1\}$$

دسته دوم

$$||x-2|-1|-k \neq 0 \leadsto ||x-2|-1| \neq k$$



$$y = |x-2|$$



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



دسته اول

$\rightarrow g_k = ||n-2|-1|$

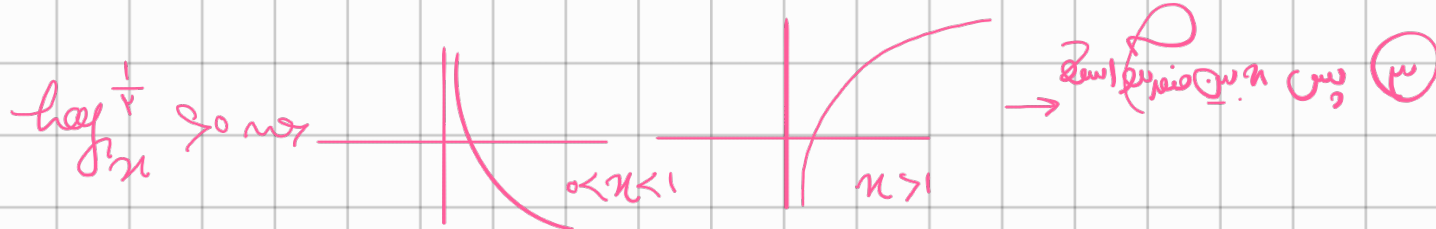
 $\rightarrow$
 در $n=1$ و $n=3$ به بیشترین مقدار می‌رسد و $k=1$ پس

$f(n) = \frac{(n+2)(n+1)}{(n+2)(n+1)} \rightarrow n \neq -2, -1$
 $\frac{n+1}{n-1} \rightarrow n \neq \pm 1$
 $\rightarrow$
 در $n=2, \pm 1$ به بیشترین مقدار می‌رسد $\rightarrow n=2$

$n^2 - 4n + 4 = 0 \rightarrow (n-2)^2 = 0 \rightarrow n=2$

$g_k = \log_{g_{k+1}} \frac{1}{g_k} \rightarrow n > 0, n \neq 1$

$\rightarrow n+1 > 0 \rightarrow n > -1$
 $n+1 \neq 1 \rightarrow n \neq 0$



$(0) \cap (1) \cap (2) \rightarrow 0 < n < 1$

$D_{f(n)} = [-\omega, \omega]$

$-\omega \leq \omega n^2 - 1 \leq \omega \rightarrow -\kappa \leq \omega n^2 \leq \kappa \rightarrow -\frac{\kappa}{\omega} \leq n^2 \leq \frac{\kappa}{\omega} \rightarrow -\frac{\sqrt{\kappa}}{\sqrt{\omega}} \leq n \leq \frac{\sqrt{\kappa}}{\sqrt{\omega}}$

$D_f = \left[-\frac{\sqrt{\kappa}}{\sqrt{\omega}}, \frac{\sqrt{\kappa}}{\sqrt{\omega}} \right]$

