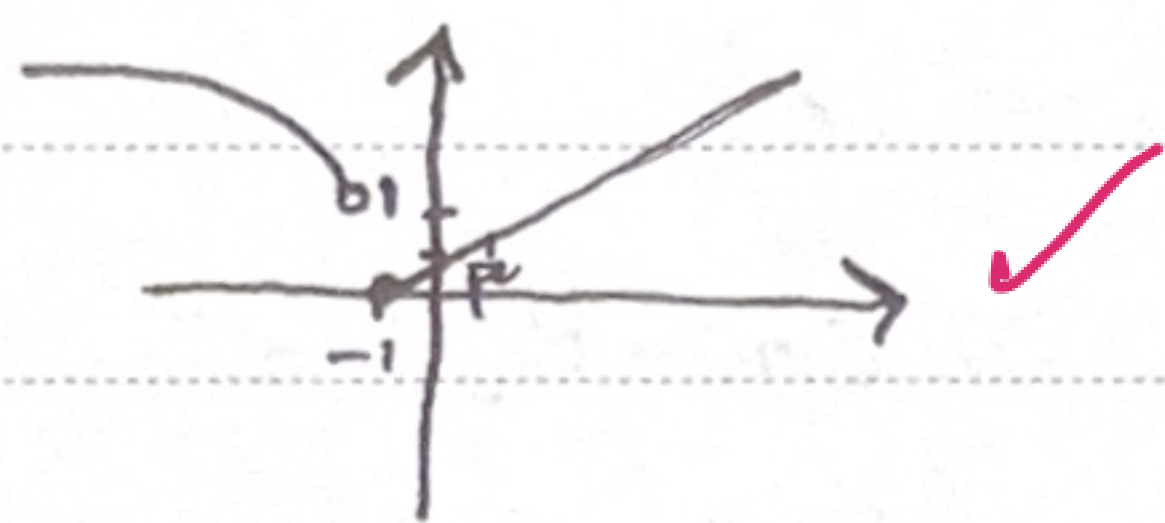


$$x = \begin{cases} y-1 & y \geq 0 \rightarrow y \geq 0 \Rightarrow y^2 \geq 0 \Rightarrow y-1 \geq -1 \Rightarrow x \geq -1 \\ -y^2 & y < 0 \rightarrow y < 0 \Rightarrow y^2 > 0 \Rightarrow -y^2 < 0 \Rightarrow x < 0 \end{cases}$$



تابع

$$g(x) = \sqrt{\frac{x f(x-1)}{f(x)}} \Rightarrow \frac{x f(x-1)}{f(x)} \geq 0$$

شماره $f(x)$ از $f(x)$ و $f(x-1)$ به دست می آید

	-4	-3	-2	-1	0	1	2	3	4	5
$f(x-1)$	-	-	0	+	+	+	0	-	0	+
$f(x)$	-	0	+	+	+	0	-	0	+	+
x	-	-	-	0	+	+	+	+	+	+
$\frac{x f(x-1)}{f(x)}$	-	+	0	-	+	+	-	0	+	+

$$D_g = (-4, -2] \cup [0, 3) \cup [5, +\infty)$$

$f(x-1)$ و $f(x)$ را در $x=1$ و $x=4$ بررسی می کنیم

$$f(x) = \frac{x^2 - 2x + 1}{x^2 - 4x}$$

الف) $f(x)$ را در $x=1$ و $x=4$ بررسی می کنیم

$$\text{الف) } x^2 - 4x \neq 0 \Rightarrow x(x-4) \neq 0 \Rightarrow x \neq 0 \text{ و } x \neq 4$$

$$D_f = \mathbb{R} - \{0, 4\}$$

$$\rightarrow \frac{x^2 - 2x + 1}{x^2 - 4x} \geq 0 \Rightarrow \Delta = 4 - 4 = 0 \Rightarrow \Delta < 0 \text{ و } a > 0 \Rightarrow$$

$$\Rightarrow x^2 - 4x > 0 \Rightarrow x < 0 \text{ یا } x > 4 \Rightarrow D_f = (-\infty, 0) \cup (4, +\infty)$$

$$\text{الف) } y = \sqrt{\frac{x-1}{x^2 - 2x - 1}} \Rightarrow x = 1$$

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

$$\Rightarrow D_f = (-\infty, +\infty) - \{1\}$$

$$x^2 - 2x - 1 = 0 \Rightarrow x = 1 \pm \sqrt{2}$$

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

$$x - 1 \neq 0 \Rightarrow x \neq 1$$

$$x < -1 \text{ یا } x > 1$$

$$-1 < x < 1$$

$$D_f = \mathbb{R} - \{1\}$$

$$\text{الف) } f(x) = \frac{\sqrt{x(x-1)}}{\sqrt{|x|+x}}$$

$$x(x-1) \geq 0 \Rightarrow x \leq 0 \text{ یا } x \geq 1$$

$$|x|+x > 0 \Rightarrow x > 0$$

$$\Rightarrow (0, +\infty)$$

$$D_f = [1, +\infty)$$

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

$$|x|-1 \neq 0 \Rightarrow x \neq \pm 1$$

$$|x-1|-x^2 \geq 0 \Rightarrow x > 1 \Rightarrow x-1-x^2 \geq 0$$

$$\Delta < 0 \Rightarrow$$

هیچ جوابی

$$x < 1 \Rightarrow -x+1-x^2 \geq 0$$

$$\Rightarrow x^2+x-1 \geq 0$$

$$\Rightarrow x = \frac{-1 \pm \sqrt{5}}{2}$$

$$\frac{-1}{-1} + \frac{1}{1} = 0$$

$$D_f = \left[\frac{-1-\sqrt{5}}{2}, \frac{-1+\sqrt{5}}{2} \right] - \{1\}$$

$$\text{الف) } y = \sqrt{(n-r)[n-r]} \Rightarrow (n-r)[n-r] \geq 0$$

$$\begin{array}{c} r \quad r \\ + \mid 0 \mid + \end{array}$$

$$\Rightarrow D_f = (-\infty, +\infty) = \mathbb{R} \checkmark$$

(r) (4)

$$\text{ب) } \sqrt{|n-1|[n-r]} \quad |n-1|[n-r] \geq 0 \rightarrow [n-r] \geq 0 \quad [n] = r$$

$$\begin{array}{c} 1 \quad r \\ - \mid - \mid 0 \mid + \end{array}$$

$$\Rightarrow [r, +\infty) \cup \{1\} = D_f$$

$$r \leq n < r$$

$$y = \frac{1}{|n-r|-1-k}$$

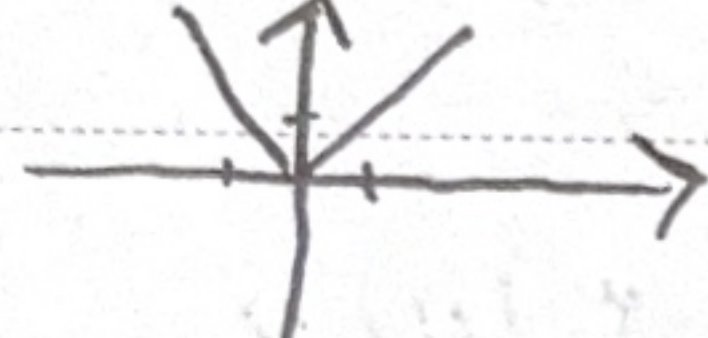
$$|n-r|-1-k \neq 0$$

$$|n-r|-1 \neq k$$

$$\text{مستحيل}$$

(r) (5)

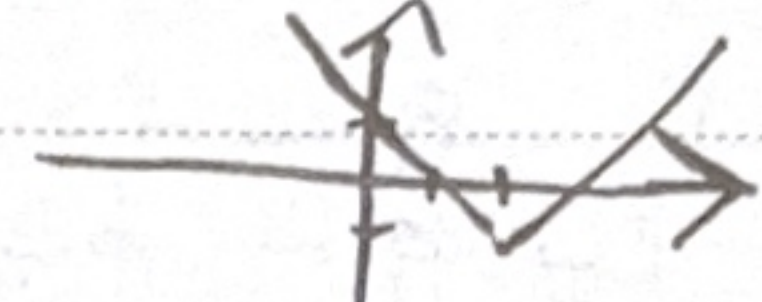
$$\text{① } y = |n|$$



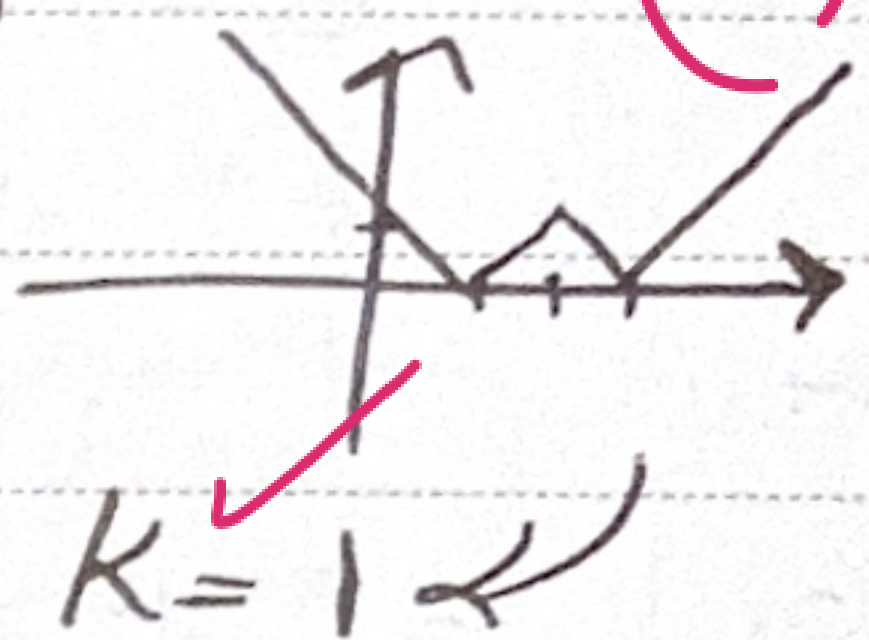
$$\text{② } y = |n-r|$$



$$\text{③ } y = |n-r|-1$$



$$\text{④}$$



(r)

$$K=1$$

$$f(n) = \frac{\frac{n^2+kn+r}{n^2+kn+r}}{\frac{n+1}{n-1}} \Rightarrow \frac{n+1}{n-1} \neq 0$$

$$\frac{n+1}{n-1} \neq 0$$

$$n-1 \neq 0 \quad n \neq 1 \quad \text{①}$$

$$n+1 \neq 0 \quad n \neq -1 \quad \text{②}$$

(r) (A)

$$n^2+kn+r \neq 0 \quad (n+1)(n+r) \neq 0 \quad \frac{n \neq -1}{n \neq -r} \quad \text{③}$$

$$\text{①, ②, ③} \Rightarrow D_f = \mathbb{R} - \{-1, -r, 1\} \Rightarrow n=1 \quad n^2-kn+r=0$$

$$n^2-kn+r=0 \Rightarrow (n-r)^2=0 \Rightarrow n=r \checkmark \rightarrow \text{مستحيل}$$

$$y = \log_{n+1} \log_n \frac{1}{r}$$

$$n+1 \neq 1 \Rightarrow n \neq 0$$

$$n+1 > 0 \Rightarrow n > -1$$

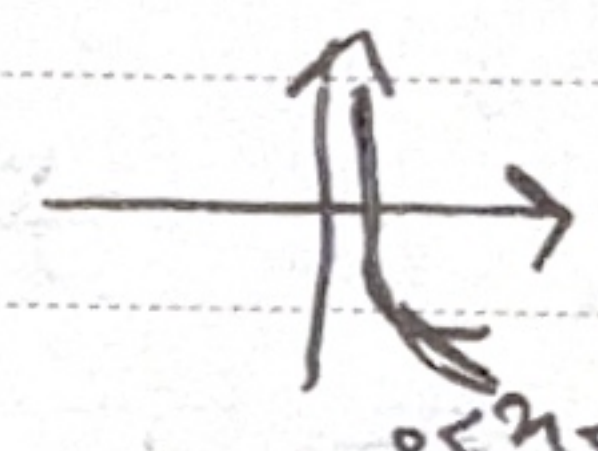
$$n > 0$$

$$n \neq 1$$

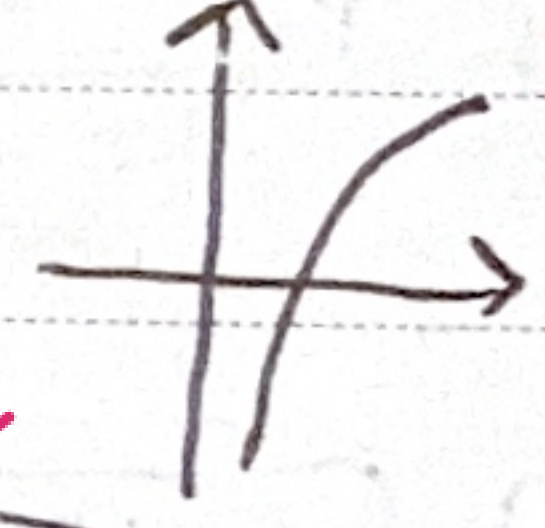
$$\log_n \frac{1}{r} > 0$$

$$\rightarrow$$

$$\text{مستحيل}$$



$$0 < n < 1$$



(r)

(r)

$$f(n) \rightarrow D_f = [-\infty, r]$$

(r) (B)

$$-\infty \leq kn^2-1 \leq r$$

$$-k \leq kn^2 \leq r$$

$$kn^2 \leq r$$

$$n^2 \leq \frac{r}{k}$$

$$\frac{-r}{\sqrt{k}} \leq n \leq \frac{r}{\sqrt{k}}$$

$$\Rightarrow \frac{-r\sqrt{k}}{k} \leq n \leq \frac{r\sqrt{k}}{k}$$

$$D_f(kn^2-1) = \left[-\frac{r\sqrt{k}}{k}, \frac{r\sqrt{k}}{k} \right]$$