

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

$$r^2x^2 - 2rx + r^2 - 1$$

$$D_f = R - \left\{1, \frac{r}{r}, \frac{\omega}{r}\right\}$$

(الف)

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

$$D_f = R - \left\{-1, -\frac{r}{r}, r\right\}$$

(ب)

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

$$\begin{aligned} r-2x &\geq 0 \\ r &\geq 2x \\ x &\leq \frac{r}{2} \end{aligned}$$

$$\begin{aligned} x - \sqrt{r-2x} &\neq 0 \\ x &\neq \sqrt{r-2x} \end{aligned}$$

(ج)

$$D_f = (-\infty, 1) \cup (1, \frac{r}{2}]$$

$$y = \frac{x+r}{x - \sqrt{rx-r}}$$

$$\begin{aligned} rx-r &\geq 0 \\ rx &\geq r \\ x &\geq \frac{r}{r} \end{aligned}$$

$$\begin{aligned} x - \sqrt{rx-r} &\neq 0 \\ x &\neq \sqrt{rx-r} \end{aligned}$$

(د)

$$D_f = \left[\frac{r}{r}, 1\right) \cup (1, r) \cup (r, \infty)$$

$$y = \frac{\sin x}{r \cos x - 1}$$

$$\begin{aligned} r \cos x - 1 &\neq 0 \\ r \cos x &\neq 1 \end{aligned}$$

$$\cos x \neq \frac{1}{r} \rightarrow \cos x = \frac{1}{r} \begin{cases} x = \frac{\pi}{r} (90^\circ) \\ x = -\frac{\pi}{r} (270^\circ) \end{cases}$$

(هـ)

$$D_f = R - \left\{rk\pi \pm \frac{\pi}{r} \mid k \in \mathbb{Z}\right\}$$

$$y = \frac{\cos x + 1}{r \sin x + 1}$$

$$\begin{aligned} r \sin x + 1 &\neq 0 \\ r \sin x &\neq -1 \end{aligned}$$

$$\sin x \neq -\frac{1}{r} \rightarrow \sin x = -\frac{1}{r} \begin{cases} x = \frac{5\pi}{4} (225^\circ) \\ x = \frac{7\pi}{4} (315^\circ) \end{cases}$$

(و)

$$D_f = R - \left\{rk\pi + \frac{5\pi}{4}, rk\pi + \frac{7\pi}{4} \mid k \in \mathbb{Z}\right\}$$

$$y = \frac{\tan x + r}{\cot x - 1}$$

$$\cot x - 1 \neq 0 \rightarrow \cot x \neq 1$$

$$\cot x = 1 \rightarrow \cot x = \frac{\cos x}{\sin x}$$

$$\cot x = 1 \begin{cases} x = \frac{\pi}{4} (45^\circ) \\ x = \frac{5\pi}{4} (225^\circ) \end{cases}$$

$$\sin x \neq 0 \rightarrow \sin x = 0 \Rightarrow x = k\pi$$

(ز)

$$D_f = R - \left(\left\{ \frac{n\pi}{r} \mid n \in \mathbb{Z} \right\} \cup \left\{ k\pi + \frac{\pi}{r} \mid k \in \mathbb{Z} \right\} \right)$$

$$y = \frac{\sin x + 1}{\sin x - r}$$

$$r \sin x - r \neq 0$$

$$r \sin x - r = 0$$

$$r \sin x = r$$

$$\sin x = \frac{r}{r} \rightarrow \sin x = \pm \sqrt{\frac{r}{r}} = \pm \frac{\sqrt{r}}{\sqrt{r}}$$

$$x = \frac{r\pi}{r} + YK\pi$$

$$x = \frac{\omega\pi}{r} + YK\pi$$

$$D_f = R - \left(\left\{ \frac{\pi}{r} + K\pi \mid K \in \mathbb{Z} \right\} \cup \left\{ \frac{Y\pi}{r} + K\pi \mid K \in \mathbb{Z} \right\} \right)$$

$$x^r - 2x + 4 > 0$$

$$(x-1)(x-2) > 0$$

$$x=1 \quad x=2$$

$$(-\infty, 1) \cup (2, \infty)$$

$\Leftrightarrow$

o/b	$x-1$	$x-2$	$(x-1)(x-2)$	(-)
$(-\infty, 1)$	-	-	+	
$(1, 2)$	+	-	-	
$(2, \infty)$	+	+	+	

$$x^r - 9x + 2 > 0$$

$$(x-1)(x-\omega) < 0$$

$$x=1 \quad x=\omega$$

$$(1, \omega)$$

$\Leftrightarrow$

o/b	$x-1$	$x-\omega$	$(x-1)(x-\omega)$	(-)
$(-\infty, 1)$	-	-	+	
$(1, \omega)$	+	-	-	
(ω, ∞)	+	+	+	

$$x^r + 9x + \omega \geq 0$$

$$(x+1)(x+\omega) \geq 0$$

$$x=-1 \quad x=-\omega$$

$$(-\infty, -\omega] \cup [-1, \infty)$$

$\Leftrightarrow$

o/b	$x+1$	$x+\omega$	$(x+1)(x+\omega)$	(-)
$(-\infty, -\omega)$	-	-	+	
$(-\omega, -1)$	-	+	-	
$(-1, \infty)$	+	+	+	

$$x^r - 7x + 9 \leq 0$$

$$(x-1)(x-9) \leq 0$$

$$x=1 \quad x=9$$

$$[1, 9]$$

$\Leftrightarrow$

o/b	$x-1$	$x-9$	$(x-1)(x-9)$	(-)
$(-\infty, 1)$	-	-	+	
$(1, 9)$	+	-	-	
$(9, \infty)$	+	+	+	

$$\frac{x^r - 7x + 9}{x-2} < 0$$

$$\frac{(x-1)(x-9)}{x-2} < 0$$

$$x=1, x=9$$

$$x=2$$

$$(-\infty, 1) \cup (2, 9)$$

$\Leftrightarrow$

o/b	$x-1$	$x-2$	$x-9$	$\frac{(x-1)(x-9)}{x-2}$	(-)
$(-\infty, 1)$	-	-	-	-	
$(1, 2)$	+	-	-	+	
$(2, 9)$	+	+	-	-	
$(9, \infty)$	+	+	+	+	

$$g = \frac{x^2 - x}{x^2 + x}$$

بازه	$x+1$	$x-1$	$g = \frac{x-1}{x+1}$
$x < -1$	-	-	+
$x = -1$	0	-	ت
$-1 < x < 0$	+	-	-
$x = 0$	+	-	ت
$0 < x < 1$	+	-	-
$x = 1$	+	0	0
$x > 1$	+	+	+

(۱) روش آسان

$y > 0$: $x > 1, x < -1$
 $y < 0$: $-1 < x < 0, 0 < x < 1$
 $y = 0$: $x = 1$

نقطه شده در نظر بگیرید

خرج صفر باشد یعنی
 $x = 0$
 $x = -1$

روش دیگر (۲) بازه $x > 1$: $x-1 > 0, x+1 > 0, x > 0 \Rightarrow y > 0$

بازه $0 < x < 1$: $x-1 < 0, x+1 > 0, x > 0 \Rightarrow y < 0$

بازه $-1 < x < 0$: $x-1 < 0, x+1 > 0, x < 0 \Rightarrow y < 0$

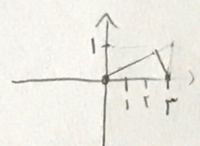
بازه $x < -1$: $x-1 < 0, x+1 < 0, x < 0 \Rightarrow y > 0$

$$\frac{x - f(x)}{f(x)} \geq 0$$

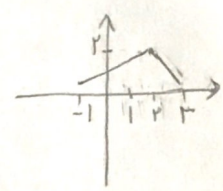
$$\frac{-2}{-2} + \frac{2}{-2} + \frac{3}{-2}$$

$$D_f = (-2, -1] \cup (2, 3]$$

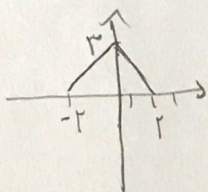
(۹)



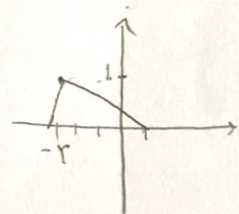
(۱)



(۱۰) الف



(۱)



(۲)