

الف) $u^2 - 5u + 6 > 0$

$$\frac{(u-2)(u-3)}{u}$$

u	2	3
y	+	-

$(-\infty, 2) \cup (3, +\infty)$

ب) $u^2 - 4u + 4 < 0$

$$\frac{(u-2)(u-1)}{u}$$

u	1	2
y	+	-

ج) $u^2 + 4u + 4 \geq 0$

$$\frac{(u+2)(u+1)}{u}$$

u	-2	-1
y	+	-

$[-2, +\infty) \cup (-\infty, -1]$

د) $u^2 - 6u + 9 \leq 0$

$$\frac{(u-3)(u-1)}{u}$$

u	1	3
y	+	-

$[1, 3]$

الف) $\frac{u^2 - 2u + 1}{u - 1} < 0$ $(-\infty, 1) \cup (2, +\infty)$

$$\frac{(u-1)(u-1)}{(u-1)}$$

u	1	2
y	-	+

ب) $\frac{n^2-1}{n^2-4n+5} \geq$

$\frac{n^2-4n+5}{(n-1)(n-1)}$

$\frac{n}{y} \begin{array}{c|ccc} & -1 & 1 & 5 \\ \hline & + & - & - & + \end{array}$

✓

$(5, +\infty) \cup (-\infty, -1]$

الف) $y = \sqrt{\frac{n^2-1}{n^2-4n+5}} = \sqrt{\frac{(n-1)(n+1)}{n(n-1)(n+1)}} \rightarrow \Delta < 0, \Delta = 1 - 4 - 5 = -8$

$\frac{n}{y} \begin{array}{c|ccc} & -1 & 0 & 1 \\ \hline & + & - & - & + \end{array}$

✓

$(1, +\infty) \cup (-\infty, -1) \cup (0, 1)$

ب) $y = \sqrt{\frac{n^2-14}{n^2-8n+8}} = \sqrt{\frac{(n-2)(n+2)}{(n-4)(n-1)}} \rightarrow \frac{n}{y} \begin{array}{c|ccc} & -2 & 1 & 2 \\ \hline & + & - & - & + \end{array}$

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

الف) $y = \sqrt{4 - \sqrt{r-u}} \rightarrow$

$r-u \geq 0 \rightarrow r \geq u \quad ①$

$4 - \sqrt{r-u} \geq 0 \rightarrow 4 \geq \sqrt{r-u} \rightarrow 16 \geq r-u$

$u \geq -14 \quad ② \rightarrow \boxed{r \geq u \geq -14}$

ب) $\sqrt{r} - \sqrt{u-r} \rightarrow$

$u-r \geq 0 \rightarrow u \geq r \quad ①$

$\sqrt{r} - \sqrt{u-r} \geq 0 \rightarrow \sqrt{r} \geq \sqrt{u-r} \rightarrow r \geq u-r \rightarrow 11 \geq u \quad ②$

①, ② $\rightarrow \boxed{11 \geq u \geq r}$

الف) $y = \sqrt{6-2u} = \sqrt{(2-\sqrt{2}u)(2+\sqrt{2}u)}$

$$\begin{array}{c|c|c} & -\sqrt{2} & +\sqrt{2} \\ \hline & - & + \end{array}$$

✓ $[-\sqrt{2}, \sqrt{2}]$

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ب) $y = \sqrt{3|u|-9}$

$3|u|-9 \geq 0$

$3|u| \geq 9$

$|u| \geq 3$

$\begin{cases} u \leq -3 \\ u \geq 3 \end{cases}$

✓ 7

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الف) $y = \sqrt[3]{\frac{|u|+1}{|u|-2}}$

$\Rightarrow |u|-2 \neq 0$

$|u| \neq 2 \rightarrow u \neq \pm 2$

✓ $D_f = \mathbb{R} - \{2, -2\}$

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ب) $y = \sqrt[3]{\frac{\sqrt{u}+1}{\sqrt{u}-2}}$

✓ $D_f = \mathbb{R} - \{9\}$

$u \geq 0$ ①

$\sqrt{u}-2 \neq 0$

$\sqrt{u} \neq 2 \Rightarrow u \neq 4$ ②

~~$y = \sqrt[3]{\frac{\sqrt{u}+1}{\sqrt{u}-2}}$~~

$\nearrow \text{مثال 1}$

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الف) $y = \frac{\sin u}{\cos u - 1}$

$\cos u - 1 \neq 0$

$\cos u \neq 1$

$\bigoplus_{u=0, 2\pi, \dots}$

$D_f = \mathbb{R} - \{2k\pi\}$

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برای هر r

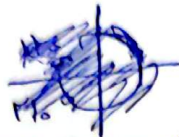
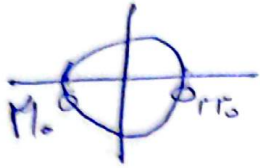
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برای هر r

ب) $y = \frac{\cos u + 1}{r \sin u + 1}$

$r \sin u + 1 \neq 0$
 $\sin u \neq -\frac{1}{r}$

$Df = R - \left\{ r k \pi + \frac{\pi}{2}, r k \pi + \frac{3\pi}{2} \right\}$



1

2) $y = \frac{\tan u + r}{\cot u - 1}$

$\tan u = \frac{\sin u}{\cos u} \Rightarrow \cos u \neq 0$
 $\cot u - 1 \neq 0 \Rightarrow \cot u \neq 1$
 $\cot u \neq 1$

$\cot u = \frac{\cos u}{\sin u}$

$\sin u \neq 0$

1



$Df = R - \left\{ k\pi, k\pi - \frac{\pi}{2}, k\pi + \frac{\pi}{2} \right\}$

1) $\cos u \neq 0 \Rightarrow u \neq \frac{\pi}{2}, u \neq \frac{3\pi}{2} \Rightarrow u \neq k\pi$

2) $\sin u \neq 0 \Rightarrow u \neq k\pi - \frac{\pi}{2}, u \neq k\pi + \frac{\pi}{2}$

3) $\cot u \neq 1 \Rightarrow u \neq k\pi + \frac{\pi}{4}, u \neq k\pi + \frac{5\pi}{4}$



1

3) $y = \frac{\sin u + 1}{r \sin u + 1}$

$r \sin u + 1 \neq 0$
 $r \sin u \neq -1$
 $\sin u \neq -\frac{1}{r}$

$\frac{1}{r} \neq \sin u$

$\sin u \neq \pm \frac{1}{r} \Rightarrow u \neq \frac{\pi}{2}, \frac{3\pi}{2}, \frac{\pi}{r}, \frac{5\pi}{r}$

$Df = R - \left\{ k\pi \pm \frac{\pi}{2} \right\}$

$y = \frac{1}{\sqrt{r|u-r| - \frac{1}{r}}}$

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$r|u-r| - \frac{1}{r} > 0 \Rightarrow r|u-r| > \frac{1}{r} \Rightarrow |u-r| > \frac{1}{r^2}$

$u-r > \frac{1}{r^2} \Rightarrow u > r + \frac{1}{r^2}$
 $u-r < -\frac{1}{r^2} \Rightarrow u < r - \frac{1}{r^2}$

$Df = \left(\frac{1}{r^2}, +\infty \right) \cup \left(-\infty, r - \frac{1}{r^2} \right)$

الف) $y = \sqrt{r-r|u|} \rightarrow r-r|u| \geq 0 \rightarrow r \geq r|u| \rightarrow r \geq |u|$

$\rightarrow r \geq u \geq -r$

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ب) $\sqrt{\frac{|u|}{|u|}}$ $Df = R - \{0\}$

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