

الف) $f(x) = x^2 - 1$ 	ب) $f(x)$ 	ج) $f(x-1)$ 	د) $-f(x)$ 	۱
الف) $x^2 - 5x + 4 > 0$ $(x-1)(x-4) > 0$ $\frac{x-1}{x-4} > 0$ $(1, \infty) \cup (-\infty, 4)$	ب) $x^2 - 4x + 5 < 0$ $(x-1)(x-5) < 0$ $\frac{x-1}{x-5} < 0$ $(1, 5)$	ج) $x^2 + 4x + 5 > 0$ $(x+1)(x+5) > 0$ $\frac{x+1}{x+5} > 0$ $(-\infty, -5] \cup [-1, \infty)$	د) $x^2 - 6x + 4 < 0$ $(x-1)(x-4) < 0$ $\frac{x-1}{x-4} < 0$ $[1, 4]$	۲
الف) $\frac{x^2 - 3x + 2}{(x-5)} < 0$ $\frac{(x-1)(x-2)}{(x-5)} < 0$ $\frac{x-1}{x-5} < \frac{x-2}{x-5}$ $(-\infty, 1) \cup (2, 5)$	ب) $\frac{x^2 - 1}{x^2 - 4x + 5} > 0$ $\frac{(x-1)(x+1)}{(x-1)(x-5)} > 0$ $\frac{x+1}{x-5} > 0$ $(-\infty, -1] \cup (5, \infty)$	۳		
الف) $y = \sqrt{\frac{x^3 - 1}{x^3 - x}} > 0$ $x^3 - 1 = (x-1)(x^2 + x + 1)$ $x^3 - x = x(x^2 - 1) = x(x-1)(x+1)$ $y = \sqrt{\frac{(x-1)(x^2 + x + 1)}{x(x-1)(x+1)}} = \sqrt{\frac{x^2 + x + 1}{x(x+1)}}$ $D_f = (-\infty, -1) \cup (0, 1) \cup (1, \infty)$	ب) $y = \sqrt{\frac{x^3 - 14}{x^2 - 4x + 4}} > 0$ $\frac{(x-1)(x+1)}{(x-2)^2} > 0$ $\frac{x-1}{x-2} > 0$ $D_f = (-\infty, -1) \cup (2, \infty)$	۴		
الف) $\sqrt{4-x} - \sqrt{2-x}$ $4-x \geq 0 \rightarrow x \leq 4$ $2-x \geq 0 \rightarrow x \leq 2$ $\sqrt{4-x} \geq \sqrt{2-x} \rightarrow 4-x \geq 2-x \rightarrow 2 \geq 0$ $D_f = [-1, 2]$	ب) $\sqrt{3-\sqrt{x-2}}$ $x-2 \geq 0 \rightarrow x \geq 2$ $3-\sqrt{x-2} \geq 0 \rightarrow \sqrt{x-2} \leq 3 \rightarrow x-2 \leq 9 \rightarrow x \leq 11$ $D_f = [2, 11]$	۵		

$\text{ا) } y = \sqrt{e - r \ln r}$ $e - r \ln r > 0$ $r \ln r \leq e \rightarrow r \leq e \rightarrow \ln 1 \leq \sqrt{r} \rightarrow -\sqrt{r} \leq \ln \sqrt{r}$ $D_f = [-\sqrt{e}, \sqrt{e}]$	
$\text{ب) } y = \sqrt{r \ln r - 9 }$ $r \ln r - 9 > 0$ ✓ $r \ln r > 9$ $\ln r > r$ $D_f = [r, \infty) \cup (-\infty, -r]$	6
$\text{ا) } y = \sqrt{\frac{\ln r + 1}{\ln r - r}}$ $\ln r - r \neq 0$ $\ln r \neq r$ $\ln r \neq \pm r$ ✓ $D_f = \mathbb{R} - \{\pm r\}$	7
$\text{ب) } y = \sqrt{\frac{\sqrt{r} + 1}{\sqrt{r} - r}}$ $r > 0$ $\sqrt{r} - r \neq 0$ $\sqrt{r} \neq r \rightarrow r \neq 1$ $D_f = [0, \infty) - \{1\}$	8
$\text{ا) } y = \frac{\sin r}{r \cos r - 1}$ $r \cos r - 1 \neq 0$ $r \cos r \neq 1$ $\cos r \neq \frac{1}{r}$ $\mathbb{R} - \{r k \pi + \frac{\pi}{2}, r k \pi - \frac{\pi}{2}\}$	
$\text{ب) } y = \frac{\cos r + 1}{r \sin r + 1}$ $r \sin r + 1 \neq 0$ $r \sin r \neq -1$ $\sin r \neq -\frac{1}{r}$ $\mathbb{R} - \{r k \pi + \pi + \frac{\pi}{6}, r k \pi - \frac{\pi}{6}\}$	9
$\text{ج) } \frac{\tan r + r}{\cot r - 1}$ $\cot r - 1 \neq 0$ $\cot r \neq 1$ $\tan r \neq \frac{1}{r}$ $\mathbb{R} - \{k \pi + \frac{\pi}{4}\}$ $\sin r \neq 0 \rightarrow r \neq k \pi$ $\frac{\cos r}{\sin r} \neq \frac{1}{r} \rightarrow r \neq k \pi + \frac{\pi}{2}$	
$\text{د) } y = \frac{\sin^2 r + 1}{r \sin^2 r - r}$ $r \sin^2 r - r \neq 0$ $r \sin^2 r \neq r$ $\sin^2 r \neq \frac{r}{r}$ $ \sin r \neq \frac{\sqrt{r}}{r}$ $\sin r = \pm \frac{\sqrt{r}}{r}$ $\mathbb{R} - \{k \pi \pm \frac{\pi}{6}\}$ ✓	
$y = \frac{1}{\sqrt{r \ln - r + \frac{1}{e}}}$ $r \ln - r + \frac{1}{e} > 0$ $r \ln - r > -\frac{1}{e}$ $\ln - r > -\frac{1}{e r}$ $\ln - r > \frac{1}{e}$ $\ln - r > \frac{1}{e}$ $D_f = (-\infty, -\frac{1}{e}) \cup (\frac{1}{e}, \infty)$	10
$\text{ا) } y = \sqrt{e - r \ln r }$ $e - r \ln r > 0$ $r \ln r \leq e$ $\ln r \leq \sqrt{r}$ $- \sqrt{r} \leq \ln \sqrt{r}$ $D_f = [-r, r]$ ✓	
$\text{ب) } y = \sqrt{\frac{\ln r }{\ln r }}$ $r \neq 0$ $\frac{\ln r }{\ln r } > 0$ $D_f = \mathbb{R} - \{0\}$	11