

الف) $\frac{(w-1)^2 - w^2}{w^2 - w} \geq 0 \rightarrow \frac{-2w+1}{w^2-w} \geq 0$ $\frac{0}{+} \frac{+}{-} \frac{1}{+}$ $D_f = (-\infty, 0) \cup [\frac{1}{2}, 1)$

ب) $f(w) = \frac{\frac{1}{w+1} - \frac{2}{w}}{\frac{2}{w-1} + \frac{1}{w+2}}$ $D = \mathbb{R} - \left\{ \frac{-5}{2}, -2, -1, 0, 1 \right\}$

تحقیق $\Rightarrow \frac{2}{w-1} + \frac{1}{w+2} \neq 0$ $\frac{2w+5}{w^2+w-2} \neq 0 \rightarrow w \neq \frac{-5}{2}$

الف) $\sqrt{\left(\left(\frac{1}{2}\right)^w - 9\right)(22 - \varepsilon^w)}$ $\frac{-2}{+} \frac{\log \frac{22}{\varepsilon}}{-} \frac{+}{+}$ $D_f = (-\infty, -2] \cup [\log \frac{22}{\varepsilon}, +\infty)$

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

$\sqrt[3]{y+1} = 3 - \sqrt[2]{w-1} \rightarrow y+1 = 9 + \sqrt{w-1} - 4\sqrt[2]{w-1}$

$y = 1 + \sqrt{w-1} - 4\sqrt[2]{w-1} \Rightarrow D_f = [1, +\infty)$

$f(w) = \frac{\log \frac{(w^2 - w - 2)}{\varepsilon}}{\sqrt{w^2 - 1} + 1}$ $w^2 - w - 2 > 0$ $(w-2)(w+1) > 0$ $\frac{-1}{+} \frac{2}{-} \frac{+}{+}$ $(-\infty, -1) \cup (2, +\infty)$
 $w^2 - 1 \geq 0$ $w^2 \geq 1$ $\frac{w}{-} \frac{1}{-} \rightarrow (-\infty, -1] \cup [1, +\infty)$
 $D_f = (-\infty, -1) \cup (2, +\infty)$

$f(w) = \sqrt{3 + aw - w^2}$ $D_f = [-2, b]$

$w = -2 \rightarrow \sqrt{-2a-1} = 0 \rightarrow -2a-1 = 0 \rightarrow a = \frac{-1}{2}$

$\Rightarrow a+b = \frac{-1}{2} + \frac{5}{2} = 2$

$\sqrt{3 + \frac{1}{2}w - w^2} \rightarrow -w^2 - \frac{1}{2}w + 3 \geq 0$ $\Delta = \frac{1}{4} + 12 = \frac{49}{4}$

$w = \frac{\frac{1}{2} \pm \sqrt{\frac{49}{4}}}{-2}$ $\frac{-2}{+} \frac{+}{-} \frac{5}{-}$ $\rightarrow D_f = [-2, \frac{5}{2}]$

$f(w) = \begin{cases} 3w-2 & w \geq 1 \\ 2w+3 & w < 1 \end{cases}$ $g(w) = \sqrt{f(w)-w}$
 $f(w) - w \geq 0$

$f(w) = w \rightarrow 3w-2 = w \rightarrow w = 1$
 $\rightarrow 2w+3 = w \rightarrow w = -3$

$\frac{-3}{+} \frac{1}{-} \frac{+}{+}$ $D_f = (-\infty, -3] \cup [1, +\infty)$

$f(w) = 2w^2 - \varepsilon w \rightarrow w(w-2)$ $f\left(\sin \frac{\pi}{4} + \cos \frac{\pi}{4}\right) \rightarrow f\left(\frac{\sqrt{2}}{2} + 1\right)$ $f\left(\frac{\sqrt{2}}{2} + 1\right) = 2\left(\frac{\sqrt{2}}{2} + 1\right)\left(\frac{\sqrt{2}}{2} - 1\right) \rightarrow \left(\frac{-1}{2}\right)$	6
$f(w) = \frac{w+1}{w-1} \quad f\left(\frac{a+1}{a-1}\right) = a$ $f\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} \rightarrow \frac{\frac{2a}{a-1}}{\frac{2}{a-1}} = a$ $D_f = \mathbb{R} - \{1\}$ ↓ ریشه مخرج	7
$f(w) = w^2 - \varepsilon w \xrightarrow{w=g(a)} f(g(a)) = (g(a))^2 - \varepsilon g(a) = -\varepsilon$ $f(g(a)) = -\varepsilon \quad (g(a))^2 - \varepsilon g(a) + \varepsilon = 0 \quad (g(a) - 2)^2 = 0$ $g(a) = 2$ $g(w) = \sqrt{w^2 - 1} \rightarrow g(a) = \sqrt{a^2 - 1} \Rightarrow \sqrt{a^2 - 1} = 2$ $a^2 - 1 = 4 \rightarrow a^2 = 5 \rightarrow \boxed{a = \pm \sqrt{5}}$	8
$f(w+3) = w^2 - 2w + 4 \Rightarrow (w-2)(w-4)$ $w+3 = 2 \rightarrow w = -1 \Rightarrow f(2) = 7 \Rightarrow f(2) \times f(-3) = \boxed{144}$ $w+3 = -3 \rightarrow w = -6 \Rightarrow f(-3) = 17$	9
$f(\varepsilon \cos^2 w + \delta \cos w) = \tan^2 w$ $\varepsilon \cos^2 w + \delta \cos w = 1, \delta$ $\varepsilon \cos^2 w + \delta \cos w - \frac{1}{\varepsilon} = 0 \Rightarrow \Delta = 2\delta + \delta^2 = 11$ $\cos w = \frac{-\delta \pm 9}{11}$ $\rightarrow \frac{1}{\varepsilon} \Rightarrow w = 40^\circ \Rightarrow \tan^2 40^\circ = \boxed{3}$ $\rightarrow \frac{1}{\varepsilon} \times$ کثیر از (1-) است	10