

الف) $\frac{n-1}{n} - \frac{n}{n-1} \geq 0$ ب) $\frac{(n-1)^2 - n^2}{n(n-1)} \geq 0$ $\frac{-2n+1}{n(n-1)} \geq 0$ $\Rightarrow D_f = (-\infty, 0) \cup [\frac{1}{2}, \infty)$	ب) $\frac{3}{n-1} + \frac{1}{n+2} \neq 0$ $\frac{3n+2}{(n-1)(n+2)} \neq 0$ $\Rightarrow D_f = \mathbb{R} - \{-2, -\frac{3}{5}, -1, 0, 1\}$
الف) $(3^x - 3^y)(3^y - 3^x) \geq 0$ $3^x(3^x - 3^y) \geq 0$ $3^x - 3^y = 1 \rightarrow 3^x - 3^y = 0$ $3^x = 3^y \rightarrow x = y$ $\Rightarrow D_f = (-\infty, -1] \cup [\frac{1}{3}, \infty)$	ب) $x-1 \geq 0 \Rightarrow x \geq 1$ $\sqrt{y+1} = 3 - \sqrt{x-1}$ $3 - \sqrt{x-1} \geq 0 \rightarrow \sqrt{x-1} \leq 3$ $x-1 \leq 9 \rightarrow x \leq 10$ $\Rightarrow 1 \leq x \leq 10$ $\Rightarrow D_f = [1, 10]$
$x^2 - x - 2 > 0$ $(x+1)(x-2) > 0$ $\frac{-1}{+} \frac{2}{-}$ $x > 2, x < -1$	$x^2 - 1 \geq 0$ $x^2 \geq 1$ $x \geq 1, x \leq -1$ $\Rightarrow D_f = (-\infty, -1) \cup (2, \infty)$
$x = -2 \rightarrow f(x) = 0$ $\sqrt{3-2a-x} = 0$ $-1-2a = 0$ $a = -\frac{1}{2}$	$x = b \rightarrow f(x) = 0$ $\sqrt{3-\frac{1}{x}b-b^2} = 0$ $\Delta = \frac{1}{x^2} + 12 = \frac{12x+1}{x^2}$ $b = \frac{\frac{1}{x} \pm \sqrt{\frac{12x+1}{x^2}}}{-2}$ $\Rightarrow a+b = -\frac{1}{x} + \frac{3}{x} = \frac{2}{x}$
$f(x) = x$ $f(x) \geq x$ $x+3 = x$ $x = -3$	$f(x) = \begin{cases} 3x-2 & x > 1 \\ x+3 & x < 1 \end{cases}$ $\Rightarrow D_f = [-3, \infty)$

$u = \sin \frac{\pi}{4} + \cos 2\pi \Rightarrow 2 \left(\sin \frac{\pi}{4} + \cos 2\pi \right)^2 + \varepsilon \left(\sin \frac{\pi}{4} + \cos 2\pi \right)$ $2 \left(\frac{\sqrt{2}}{2} + 1 + \sqrt{2} \right) - 4 \left(\frac{\sqrt{2}}{2} + 1 \right) = \frac{\sqrt{2}}{2} + 2 + \sqrt{2} - 2\sqrt{2} - 4 = -\frac{1}{2}$	9
$f(a) = \frac{a+1}{a-1} \Rightarrow a \neq 1$ $f(f(a)) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a+1+a-1}{a-1-a+1} = \frac{2a}{-2} = -a$ به ازای مرتبه‌ای از a به جز $\{1\}$ مربع است زیرا $\{1\}$ عبارت را تعریف نشده می‌اند. $a = \mathbb{R} - \{1\}$	✓
$u^2 - \varepsilon u = -\varepsilon$ $u^2 - \varepsilon u + \varepsilon = 0$ $(u-2)^2 = 0 \Rightarrow u = 2$ $\sqrt{u^2 - 1} = 2$ $u^2 - 1 = \varepsilon$ $u^2 = \omega$ $u = \pm \sqrt{\omega} \Rightarrow a = \pm \sqrt{\omega}$	Λ
$u + 3 = -3 \Rightarrow u = -6 \Rightarrow 36 + 30 + 4 = 70 = f(-3)$ $u + 3 = \varepsilon \Rightarrow u = 1 \Rightarrow 1 - \omega + 4 = 2 = f(\varepsilon)$ $f(\varepsilon) \times f(-3) = 70 \times 2 = 140$	9
$r \cos \alpha + \omega \cos \alpha = 3, \delta$ $r \cos \alpha + \delta \cos \alpha - 3, \delta = 0$ $\Delta = r\delta + \delta^2 = 11$ $\cos \alpha = \frac{-\delta \pm 9}{11} \rightarrow \cos \alpha = \frac{4}{11} \times \frac{1}{\sqrt{1 - \frac{16}{121}}} = \frac{4}{11} \times \frac{11}{5} = \frac{4}{5}$ $\Rightarrow \alpha = \frac{\pi}{3}, \frac{5\pi}{3}$ $\Rightarrow \tan^2 \alpha = (\sqrt{3})^2 \text{ و } (-\sqrt{3})^2 = 3 = f(r, \omega)$	10