

۱- $f(x) = \sqrt{\frac{x-1}{x} - \frac{1}{x-1}} = \sqrt{\frac{(x-1)^2 - x^2}{x(x-1)}} = \sqrt{\frac{1-2x}{x(x-1)}} \rightarrow \frac{1}{x}$

۲- $f(x) = \frac{1}{x+1} - \frac{1}{x} = -\frac{1}{x(x+1)} \rightarrow 0$

$D_f = (-\infty, 0) \cup \left[\frac{1}{2}, +\infty\right)$

$D_f = \mathbb{R} - \left\{-2, -\frac{1}{2}, -1, 0\right\}$

مخرجها و صورت کسر وجود در مخرج دل
نباید منفی باشد.

۳- $f(x) = \sqrt{\left(\frac{1}{x} - 1\right)(3x - 4)}$
 $x = -2$ $x = \frac{4}{3}$

$D_f = (-\infty, -2] \cup \left[\frac{4}{3}, +\infty\right)$

۴- $\sqrt{x-1} + \sqrt{y+1} = 3 \Rightarrow \sqrt{x-1} - 3 = -\sqrt{y+1} \Rightarrow \sqrt{x-1} - 3 \leq 0$

$\Rightarrow \sqrt{x-1} \leq 3 \Rightarrow x-1 \leq 9 \Rightarrow x \leq 10$ $D_f = \mathbb{D} \cap \mathbb{D} = [1, 10]$

$f(x) = \frac{\log(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1}$

$D_f = \mathbb{D} \cap \mathbb{D} = (-\infty, -1) \cup (2, +\infty)$

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۵- $f(x) = \sqrt{3+ax-x^2}$ $D_f = [-2, b]$ $a+b=? \Rightarrow -\frac{1}{2} + \frac{3}{2} = \frac{2}{2} = 1$

$-2 \Rightarrow \sqrt{3-2a-4} = 0 \Rightarrow \sqrt{-2a-1} = 0 \Rightarrow a = -\frac{1}{2}$

$\sqrt{-2a-1} = 0 \Rightarrow -2a-1 = 0 \Rightarrow a = -\frac{1}{2}$ $b = \frac{3}{2}$

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

if $x \geq 1 \Rightarrow f(x) \geq x \Rightarrow 3x-2 \geq x \Rightarrow x \geq 1 \Rightarrow [1, +\infty)$
if $x < 1 \Rightarrow f(x) \geq x \Rightarrow x+3 \geq x \Rightarrow x \geq -3 \Rightarrow [-3, 1)$ $D_g = [-3, +\infty)$

$f(x) = 2x^2 - 5x$, $f\left(\sin \frac{\pi}{4} + \cos 2\pi\right) = ?$ - 9
 $\frac{\sqrt{2}}{2} + 1 = 2 + \frac{\sqrt{2}}{2}$ $\frac{2(2+\sqrt{2})^2}{4} - 5(2+\frac{\sqrt{2}}{2})$
 $\Rightarrow \frac{2 + 2\sqrt{2} - 1 - 5\sqrt{2}}{2} = \left| -\frac{1}{2} \right|$ $\frac{2 + 2\sqrt{2}}{2} - 5 - \frac{5\sqrt{2}}{2}$

$f(x) = \frac{x+1}{x-1}$, $f(f(x)) = x$, $x = ?$ - 7
 $f(x) = \frac{x+1}{x-1} \Rightarrow f(f(x)) = \frac{\left(\frac{x+1}{x-1}\right)+1}{\left(\frac{x+1}{x-1}\right)-1} = \frac{x+1+x-1}{x-1-x+1} = \frac{2x}{-2} = -x$
 $\Rightarrow -x = x \Rightarrow x = 0$ به ازای تمام مقادیر در دامنه تعریف است.
به ازای 1 برقرار نیست (تقریباً)
که از دامنه حذف کرده ایم.

$f(x) = x^2 - 5x$, $g(x) = \sqrt{x^2 - 1}$, $f(g(x)) = -5$ - 1
 $x^2 - 5x = -5 \Rightarrow x^2 - 5x + 5 = 0 \Rightarrow (x-2)^2 = 0 \Rightarrow x = 2 \Rightarrow g(x) = 2$
 $\sqrt{x^2 - 1} = 2 \Rightarrow x^2 - 1 = 4 \Rightarrow x^2 = 5 \Rightarrow x = \pm \sqrt{5}$ مقادیر α
 $x^2 > 1 \Rightarrow x > 1$
 $\Rightarrow x < -1$

$f(x+y) = x^2 - 2x + y$, $f(x) \times f(-x) = ?$ $2 \times 12 = 24$ - 9
 $x + 3 = 5 \Rightarrow x = 2 \Rightarrow 1 - 2 + 4 = 3$
 $x + 3 = -5 \Rightarrow x = -8 \Rightarrow (-8)^2 - 2(-8) + 4 = 72$

$f(\cos^2 x + 2 \cos x) = \tan^2 x$, $f(1/5) = ?$ - 10
 $f(\cos^2 x + 2 \cos x) = \frac{1}{5} \Rightarrow \cos^2 x + 2 \cos x - \frac{1}{5} = 0$
 $\Rightarrow \left(\cos x + \frac{1}{5}\right) \left(\cos x - \frac{1}{5}\right) = 0$
 $\cos x = \frac{1}{5}$ بسته به دامنه که $\cos$ و $\sin$ است $\frac{1}{5}$ است $\tan^2 = \sqrt{1 - \cos^2}$ و $\tan^2 = -\sqrt{1 - \cos^2}$
 $\tan^2 x + 1 = \frac{1}{\cos^2 x} \Rightarrow \tan^2 x + 1 = 25 \Rightarrow \tan^2 x = 24$
جواب