

۲. آخرین عدد نوشته شده

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

$$\frac{1-2x}{x(x-1)} \quad \begin{array}{c} 0 \\ + \quad - \quad + \end{array}$$

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

الف

$$f(x) = \frac{1}{x+1} - \frac{2}{x} \rightarrow x \neq -1, 0$$

$$\frac{2}{x-1} + \frac{1}{x+2} \rightarrow \frac{x+2}{(x-1)(x+2)} \rightarrow x \neq -\frac{3}{2}, -2, 1$$

$$Df = \mathbb{R} \setminus \{-1, 0, -\frac{3}{2}, -2, 1\}$$

ب

$$f(x) = \sqrt{\left(\left(\frac{1}{x}\right)^x - 9\right)(32 - 4^x)}$$

$$\frac{-2}{+1 - \frac{1}{x} +}$$

$$\begin{array}{l} \rightarrow 32 = 2^{2x} \\ \downarrow \\ 2^5 = 2^{2x} \rightarrow x = \frac{5}{2} \end{array}$$

$$Df = (-\infty, -2] \cup \left[\frac{5}{2}, +\infty\right)$$

الف

$$\sqrt{x-1} + \sqrt{y+1} = 3 \quad \begin{array}{l} x-1 \geq 0 \\ y+1 \geq 0 \end{array}$$

$$\sqrt{y+1} = 3 - \sqrt{x-1} \quad x \geq 1$$

$$Df = [1, 182]$$

ب

$$f(x) = \frac{\log_2(x^2 - x - 2)}{\sqrt{x^2 - 1} + 1}$$

$$x^2 - x - 2 > 0 \rightarrow (x-2)(x+1) > 0 \quad \frac{-1}{+1 - 1 +}$$

$$x^2 - 1 > 0 \rightarrow (x-1)(x+1) > 0 \quad \frac{-1}{+0 - 1 +}$$

$$Df = (-\infty, -1) \cup (2, +\infty)$$

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$$f(x) = \sqrt{3 + ax - x^2} \quad \begin{array}{l} x=2 \\ 3 - 2a - 4 = -1 - 2a = 0 \end{array} \rightarrow a = -\frac{1}{2}$$

$$-x^2 - \frac{1}{2} + 3 \rightarrow \Delta = b^2 - 4ac \rightarrow \frac{1}{4} + 12 = \frac{49}{4} \rightarrow x \rightarrow \frac{\frac{1}{2} + \frac{7}{2}}{-2} = -2 \checkmark$$

$$a + b = -\frac{1}{2} + \frac{3}{2} = 1$$

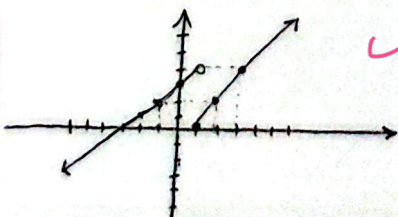
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$$f(x) = \begin{cases} 3x-2 & x \geq 1 \\ 2x+3 & x < 1 \end{cases} \quad g(x) = \sqrt{f(x) - (x)}$$

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

$$Df = [-3, +\infty)$$

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آخرین ده عدد خنثی ن

$$f(x) = x^2 - 4x + 4 = (x-2)^2 \quad f\left(\sin \frac{\pi}{4} + \cos \frac{\pi}{4}\right) \rightarrow f\left(\frac{\sqrt{2}}{2} + 1\right)$$

$$(1 + \frac{\sqrt{2}}{2})^2 - 4(1 + \frac{\sqrt{2}}{2}) + 4 = (1 + \sqrt{2} + \frac{1}{2}) - 4 - 2\sqrt{2} + 4 = \frac{3}{2} - 2\sqrt{2}$$

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$$f(x) = \frac{x+1}{x-1} \quad f(f(a)) = a \rightarrow$$

$$x = a \Rightarrow f(a) = \frac{a+1}{a-1} \rightarrow f\left(\frac{a+1}{a-1}\right) = \frac{\frac{a+1}{a-1} + 1}{\frac{a+1}{a-1} - 1} = \frac{a+1+a-1}{a+1-a} = \frac{2a}{1} = 2a$$

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$$f(x) = x^2 - 4x \quad g(x) = \sqrt{x^2 - 1} \quad \left\{ \begin{array}{l} f(g(a)) = -4 \end{array} \right.$$

$$x^2 - 4x = -4$$

$$x^2 - 4x + 4 = 0$$

$$(x-2)^2 = 0 \rightarrow x = 2 \rightarrow g(a) = 2 \rightarrow \sqrt{x^2 - 1} = 2 \rightarrow x^2 - 1 = 4 \rightarrow x^2 = 5 \rightarrow x = \pm \sqrt{5}$$

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$$f(x+y) = x^2 - 2xy + y^2 = (x-y)^2 \quad \left\{ \begin{array}{l} f(1) \times f(-3) = ? \end{array} \right.$$

$$f(1) \rightarrow x=1 \rightarrow (1-1)^2 = 0$$

$$f(-3) \rightarrow x=-3 \rightarrow (-3-(-3))^2 = 0$$

$$0 \times 0 = 0$$

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$$f(\cos x + \sin x) = \tan x \quad \left\{ \begin{array}{l} f\left(\frac{3}{5}\right) \end{array} \right.$$

$$\frac{3}{5} \rightarrow \cos = \frac{3}{5} \rightarrow \left(\frac{3}{5} \times \frac{1}{3}\right) + \left(\frac{4}{5} \times \frac{1}{4}\right) = 1 + \frac{1}{5} = \frac{6}{5}$$

$$\tan \frac{\pi}{3} \rightarrow \sqrt{3} = \frac{6}{5} \Rightarrow f\left(\frac{3}{5}\right) = \frac{6}{5}$$

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