

1 $y = \sqrt{x} f(x+1) - x^2 f(x+1) > 0 \quad x=0 \rightarrow y = \frac{0}{1-0} = 0 \rightarrow [0, +\infty) \cap I$ $\Rightarrow x \text{ به هر چه علاقت با } x+1 \text{ باشد}$ $f(x+1) \left(\frac{1}{x}\right)^{x+1} - 1 = \left(\frac{1}{x}\right)^{x-1} - 1$ $\left(\frac{1}{x}\right)^{x-1} = 1 \rightarrow x-1 = 0 \rightarrow (x=1) \rightarrow \frac{1}{x} + \frac{1}{x} - 1 = 1 \rightarrow [1, +\infty) \cap I$	2 $f(-x) = \sqrt{-x+1} - x+2 \rightarrow -x+1 - x+2 > 0 \rightarrow -x > -1 \rightarrow x < 1$ تقریب $x^2 < x^2 - 5x + 4$ $x^2 < 4$ $[x < 1] \cap D_f = (-\infty, -1)$	3 $y = \sqrt{\frac{x-1}{f(x)}} \rightarrow \frac{x-1}{f(x)} > 0 \Rightarrow x=1 \rightarrow \frac{1}{1-0} = 1 \rightarrow [1, +\infty) \cap I$ $\frac{x-1}{f(x)} = \frac{x-1}{\frac{1}{x} + \frac{1}{x} - 1} = \frac{x-1}{\frac{2}{x} - 1} = \frac{x(x-1)}{2-x} > 0 \rightarrow (x < 0) \cup (x > 2) \cap I$ $D_f = I \cap II = (-\infty, -1) \cup (2, +\infty)$	4 باجهت رویش مختلف رفتن حل شد!!!	5 $y = \sqrt{x} f(x) f\left(\frac{1}{x}\right) = f(x) - 5 f\left(\frac{1}{x}\right) > 0$ $x^2 + x - \frac{4x}{x^2} - \frac{1}{x} > 0$ $x^2 - \frac{4}{x} + x - \frac{1}{x} = x^2 + x - \frac{5}{x} > 0$ $\left(x - \frac{1}{x}\right) \left(x^2 + 1 + \frac{1}{x}\right) + \frac{1}{x} (x^2 - 5) > 0$ $x - \frac{1}{x} > 0 \Rightarrow x > \frac{1}{x} \Rightarrow x^2 > 1 \Rightarrow x > 1 \text{ یا } x < -1$ $x^2 > 1 \Rightarrow x > 1 \text{ یا } x < -1$
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$$f(x) = f(x^2 + x) \rightarrow x^2 + x = f(x) = x^2 - 12$$

$$f(10) = f(100) \rightarrow x^2 + x = 100 \rightarrow x^2 - 12x - 121$$

$$f(x) + f(10) = 17 \Rightarrow \sqrt{x^2 + x} = 17$$

$$f(x) = x^2 + 9x + 12 \Rightarrow \sqrt{x^2 + x} = 17 \Rightarrow x^2 + x = 289$$

$$x^2 + x - 289 = 0 \Rightarrow x = \frac{-1 \pm \sqrt{1 + 4 \cdot 289}}{2} = \frac{-1 \pm \sqrt{1157}}{2}$$

$$\frac{-1 \pm \sqrt{1157}}{2}$$

$$\sqrt{x^2 + x} = x$$

$$x^2 + x = x^2 \Rightarrow x = 0$$

$$f(x) = \sqrt{x^2 + x} = \sqrt{x^2 + x} = |x|$$

$$g(x) = \sqrt{x^2 + x} = \sqrt{x^2 + x} = |x|$$

$$|x| + |x| = 2|x| = 2 \Rightarrow |x| = 1 \Rightarrow x = \pm 1$$

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

$$D_f \cap D_g = \{x \neq 0\} \Rightarrow \frac{1}{x-1} = \frac{1}{x} \Rightarrow x = 1$$

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$$f(x) = \frac{1}{x-1} \Rightarrow \left\{ \left(\frac{1}{2}, 2 \right), \left(\frac{2}{3}, 3 \right), \left(\frac{3}{4}, 4 \right), \dots \right\}$$

$$g(x) = \frac{1}{x} \Rightarrow \left\{ (1, 1), (2, \frac{1}{2}), (3, \frac{1}{3}), \dots \right\}$$

$$h(x) = \frac{1}{x+1} \Rightarrow \left\{ (-1, 1), (0, \frac{1}{2}), (1, \frac{1}{3}), \dots \right\}$$

$$i) \frac{1}{x} = \frac{1}{x+1} \Rightarrow x = 1$$