

$$f(x) = \left(\frac{x}{x+1}\right)^{x-1} \quad y = \sqrt{x^3 f(x+1)} = \sqrt{x^3 \left(\frac{1}{x}\right)^{x-1}}$$

$$\left(\frac{1}{x}\right)^{x-1} - 1 = 0 \quad x=1$$

x	0	1		
x^3	-	0	+	+
$\left(\frac{1}{x}\right)^{x-1} - 1$	+	+	0	-
$x^3 \left(\frac{1}{x}\right)^{x-1} - 1$	-	0	+	-

$$D_f = [0, 1]$$

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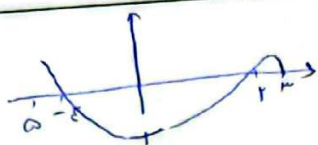
$$f(x) = \sqrt{x+|x+1|} \rightarrow f(-x) = \sqrt{-x+|1-x|}$$

$$-x+|1-x| \geq 0 \rightarrow |1-x| \geq x \quad \begin{cases} x \leq 1 \\ 1-x \geq x \rightarrow 1 \geq 2x \rightarrow x \leq \frac{1}{2} \end{cases}$$

$$D_f = (-\infty, \frac{1}{2}]$$

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$$y = \sqrt{\frac{x-1}{f(x)}}$$



x	-1	0	1	2	3
$x-1$	-	-	0	+	+
$f(x)$	+	0	-	+	0
$\sqrt{\frac{x-1}{f(x)}}$	-	0	+	+	+

$$D_f = (-1, 0] \cup (2, 3)$$

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$$9x^4 - 12x^3 - 4x - 3 = (3x^2 + x + 1)(3x^2 - x - 3)$$

$$x = \frac{1 \pm \sqrt{13}}{4}$$

$$\frac{1}{3x^2 + ax + b} = \frac{1}{3x^2 - x - 3} \quad a = -1 \quad b = -3$$

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

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$$f(x) = x^4 + x$$

$$y = \sqrt{f(x) - f\left(\frac{x}{2}\right)} = \sqrt{x^4 + x - \left(\left(\frac{x}{2}\right)^4 + \frac{x}{2}\right)} = \sqrt{x^4 + x - \frac{x^4}{16} - \frac{x}{2}} = \sqrt{\frac{15x^4}{16} + \frac{x}{2}}$$

$$x^4 + x - \frac{x^4}{16} - \frac{x}{2} = \frac{15x^4}{16} + \frac{x}{2} = (x^2 + 14)(x^2 - 2)$$

x	-2	0	2
$x^2 - 2$	-	0	+
$x^2 + 14$	+	+	+

$$D_f = [-2, 0] \cup [2, +\infty)$$

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$$f(x^2+x) = 2x^2-1$$

$$x=2 \rightarrow f(10)=V$$

$$x=1 \rightarrow f(2)=1$$

$$f(10)+f(2)=V+1=\boxed{A}$$

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$$f(x) = x^3 - 4x^2 + 12x - 1 + 1 = (x-2)^3 + 1 \rightarrow f(\sqrt[3]{2}+2) = (\sqrt[3]{2}+2)^3 + 1 = 10$$

$$g(x) = x^3 + 9x^2 + 27x + 27 - 27 = (x+3)^3 - 27 \rightarrow g(\sqrt[3]{27}-3) = (\sqrt[3]{27}-3)^3 - 27 = -20$$

$$\frac{-20}{10} = -2$$

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$$f(x) = \sqrt{x+4}\sqrt{x-4}$$

$$g(x) = \sqrt{x-4}\sqrt{x-4}$$

$$f(x)+g(x) = \sqrt{(x-4)+4}\sqrt{x-4+4} + \sqrt{(x-4)-4}\sqrt{x-4+4} = \sqrt{(x-4+4)^2} + \sqrt{(x-4-4)^2} =$$

$$|\sqrt{x-4}+2| + |\sqrt{x-4}-2| = 2\sqrt{x-4}$$

$$\frac{a+b}{c} = \frac{2}{-4} = -\frac{1}{2}$$

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$$f(x) = \frac{x+2}{x^2-5x+3}$$

$$g(x) = \{(2,1), (1,0), (0,2), (3,4)\}$$

$$\frac{g}{f} = ?$$

$$x^2-5x+3=0 \rightarrow x^2=5x-3$$

$$D_{\frac{g}{f}} = \{2,1,0,3\} - \{1,3\} = \{0,2\}$$

$$\frac{g}{f} = \{(2, \frac{1}{-4}), (0, \frac{2}{3})\}$$

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$$f(x) = \{(1,2), (3,-1), (4,2), (-1,4)\}$$

$$g(x) = \{(-2,3), (1,-1), (3,2), (-1,0)\}$$

$$a) f(2x) = \{(\frac{1}{2},2), (\frac{3}{2},-1), (2,2), (-\frac{1}{2},4)\}$$

$$b) f(x^2) = \{(1,2), (-1,2), (\sqrt{2},-1), (-\sqrt{2},-1), (2,2), (-2,2)\}$$

$$c) f(g(x)) = g(f(x))$$

$$x=-2 \rightarrow g(f(-2)) = g(3) = 2\checkmark$$

$$x=1 \rightarrow g(f(1)) = g(-1) = 0\checkmark$$

$$x=3 \rightarrow g(f(3)) = g(-1) = 0\checkmark$$

$$\{(-2,0), (1,1)\}$$

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$$x = -1$$

$$g(f(-1)) = g(0) = 0$$

$$d) \frac{f}{g} = \{(1,-4), (3,-1)\}$$

$$D_{\frac{f}{g}} = \{1,3,-1\} - \{-1\} = \{1,3\}$$