

$$y = \sqrt{x^3 f(x+1)} \rightarrow x^3 \times (x^3 - 1) \geq 0 \quad \frac{+}{-} \frac{+}{+} \frac{-}{-}$$

$$D_f = [0, 1] \checkmark$$

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$$f(-x) = \sqrt{|x-x|-x} \Rightarrow |x-x|-x \geq 0 \quad \frac{+}{+} \frac{-}{-} \frac{+}{-}$$

$$x - 2x \geq 0 \Rightarrow x \leq 0 \Rightarrow x \leq 1$$

$$D_f = (-\infty, 1] \checkmark$$

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

$$\frac{+}{-} \frac{+}{+} \frac{+}{-} \quad (I)$$

$$\frac{+}{+} \frac{+}{-} \frac{+}{+} \frac{+}{-} \quad (II)$$

$$\Rightarrow \frac{+}{-} \frac{+}{+} \frac{+}{-} \frac{+}{+} \frac{+}{-} \rightarrow D_f = (-1, 1] \cup (2, 3) \checkmark$$

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$$(3x^2 - x - 3)(3x^2 + x + 1)$$

$$\rightarrow \Delta < 0$$

$$\Rightarrow 3x^2 - x - 3 \leq 3x^2 + x + 1 \Rightarrow b = -3, a = -1$$

$$\Rightarrow \sqrt{-(a+b)} \rightarrow \sqrt{-(-1-3)} = (2) \checkmark$$

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

$$\frac{+}{-} \frac{+}{+} \frac{+}{-} \frac{+}{+}$$

$$\Rightarrow f(x) - f\left(\frac{1}{x}\right) \geq 0$$

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

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

$$f(1+2) = f(3) = 3-1 = 2$$

$$f(2) + f(1) = 1 + 2 = 3 \quad \checkmark$$

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

$$g(x) = (x+3)^2 - 2V$$

$$\Rightarrow \frac{g(\sqrt{V-2})}{f(\sqrt{V-2})} = \frac{V-2V}{2+1} = \frac{-V}{3} = -\frac{V}{3} \quad \checkmark$$

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

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

$$f(x) + g(x) = 2\sqrt{x-4} \Rightarrow a=0, b=2, c=-4$$

$$\frac{a+b}{c} = \frac{0+2}{-4} = -\frac{1}{2} \quad \checkmark$$

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$$f(x) = \frac{(x+2)}{(x-1)(x-3)} \Rightarrow D_{\frac{f}{f}} = \{2, 0\}$$

$$\frac{f}{f} = \left\{ \left(2, \frac{1}{-1}\right), \left(0, \frac{2}{-3}\right) \right\} = \left\{ \left(2, -\frac{1}{1}\right), \left(0, -\frac{2}{3}\right) \right\} \quad \checkmark$$

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$$f(x) = \left\{ \left(\frac{1}{2}, 2\right), \left(\frac{2}{3}, -1\right), (2, 2), \left(-\frac{1}{2}, 2\right) \right\} \quad \checkmark$$

$$b) f(x^2) = \left\{ (1, 2), (-1, 2), (2, -1), (-2, -1), (2, 2), (-2, 2) \right\} \quad \checkmark$$

$$c) 2y^2(x) + 1 = \left\{ (-2, 1), (1, 3), (3, 9), (-1, 1) \right\} \quad \checkmark$$

$$d) \frac{2f}{g} = \left\{ (1, -4), (3, -1) \right\} \quad \checkmark$$

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