

$$f(x) = \begin{cases} (x+1)(x+2) & x > 1 \\ 3x + 2x & x \leq 1 \end{cases} \quad \left. \begin{array}{l} 2f(x) = f(-2) + 4 \Rightarrow 2(x+1)(x+2) = 3(-2) + 2(-2) \\ |f(x)|^2 = f(x) \rightarrow |x+2| = 1 \rightarrow x = -1 \end{array} \right\}$$

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$$f(x) = \sqrt{x} + \frac{1}{\sqrt{x}} + 2 \quad f(2-\sqrt{3}) + f(2+\sqrt{3}) \rightarrow \frac{1}{\sqrt{2-\sqrt{3}}} + \frac{\sqrt{2+\sqrt{3}}}{\sqrt{2-\sqrt{3}}} = \frac{\sqrt{2+\sqrt{3}}}{\sqrt{4-3}} = \sqrt{2+\sqrt{3}}$$

$$\sqrt{2-\sqrt{3}} + \frac{1}{\sqrt{2-\sqrt{3}}} + 2 + \sqrt{2+\sqrt{3}} + \frac{1}{\sqrt{2+\sqrt{3}}} + 2 \rightarrow \frac{1}{\sqrt{2-\sqrt{3}}} = \sqrt{2+\sqrt{3}}$$

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$$2(\sqrt{2-\sqrt{3}} + \sqrt{2+\sqrt{3}} + 2) \rightarrow (\sqrt{2-\sqrt{3}} + \sqrt{2+\sqrt{3}})^2 \rightarrow 4 + 2 \rightarrow 6 \rightarrow 2(\sqrt{6} + 2) \rightarrow 2\sqrt{6} + 4$$

$$\left. \begin{array}{l} 2f(x) - 3f(-x) = f(x^2) \rightarrow 2f(x) - 3f(-x) = 1x^2 - 2x \\ 2f(-x) - 3f(x) = f(x^2) + x \rightarrow 2f(-x) - 3f(x) = 1x^2 + x \end{array} \right\} \xrightarrow{+} -f(x) = 2x^2 + x$$

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

$$(x+1)f(x) - 3xf(x+1) = f(x^2) - mx + m-1$$

$$x=0 \rightarrow f(0) = 0 = m-1 \quad \left. \begin{array}{l} x=1 \rightarrow 0 - 2f(0) = 1 + m + m-1 \\ -2f(0) = 1 + 2m \rightarrow f(0) = -\frac{1}{2} - m \end{array} \right\}$$

$$\left. \begin{array}{l} f(0) = 9m-1 \\ + f(0) = 10m+0m \end{array} \right\} \quad 9m-1 = 10m \rightarrow m = -1 \rightarrow \frac{9}{5} = \frac{9}{5}$$

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$$f(m) + f\left(\frac{1}{a}\right) = \frac{f(a^2) - f(a+1)}{a} \rightarrow a^2 + b + \frac{a}{a} + b = 3a - 1 + \frac{1}{a} \rightarrow a^2 + \frac{a}{a} + 2b = 3a - 1 + \frac{1}{a}$$

$$\Rightarrow a = 3, b = -2$$

$$f(x) = 3x - 4 \rightarrow f(-1) = -3 - 4 = -7$$

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| $f(x) = (x-1)\sqrt{1-x} \rightarrow D_f = 1-x \geq 0 \rightarrow x \leq 1 \checkmark$<br>$g(x) = -\sqrt{1-x} \rightarrow D_g = 1-x \geq 0 \rightarrow x \leq 1 \checkmark$<br>$q(x) = -(1-x)\sqrt{1-x} \rightarrow (x-1)\sqrt{1-x}$<br>$\left\{ D_f = D_g = (-\infty, 1] \right.$<br>$f = g$                                                                                                                                                                                                                                      | ٦  |
| $f(x) = x\sqrt{x} \rightarrow D_f = [0, +\infty)$<br>$g(x) = \sqrt{x^3} \rightarrow D_g = [0, +\infty)$<br>$\left. \vphantom{\begin{matrix} f(x) \\ g(x) \end{matrix}} \right\} D_f = D_g = [0, +\infty)$<br>$q(x) = x\sqrt{x} \quad f = g$                                                                                                                                                                                                                                                                                       | ٧  |
| $f(x) = [\sqrt{x} - \lfloor \sqrt{x} \rfloor] \rightarrow \sqrt{x} \geq 0 \rightarrow x \geq 0 \rightarrow 0 \leq \sqrt{x} - \lfloor \sqrt{x} \rfloor < 1 \rightarrow f(x) = 0$<br>$g(x) = \sqrt{x -  x } \rightarrow x -  x  \geq 0 \rightarrow x \geq  x  \left\{ \begin{array}{l} x \geq 0 \rightarrow x \geq x \rightarrow g(x) = 0 \\ x < 0 \rightarrow x \geq -x \rightarrow x \geq 0 \rightarrow g(x) = 0 \end{array} \right.$<br>$f = g$                                                                                  | ٨  |
| $f = \{(1, 2), (2, 3), (3, 1), (0, 0)\} \cdot g = \{(-1, 1), (1, 1), (2, 3), (3, 0), (0, 2), (\sqrt{2}, 1)\}$<br>$\frac{f(1) \cdot g(1)}{f(1) - g(1)} \rightarrow \frac{f(1) \cdot g(1)}{f(1) - g(1)} \rightarrow \frac{2 \cdot 1}{2 - 1} = 2$<br>$\frac{f(2) \cdot g(2)}{f(2) - g(2)} \rightarrow \frac{f(2) \cdot g(2)}{f(2) - g(2)} \rightarrow \frac{3 \cdot 3}{3 - 3} = \frac{9}{0} \rightarrow \text{تعرّف نشد}$<br>$\left. \vphantom{\begin{matrix} f(1) \\ f(2) \end{matrix}} \right\} f(0) \cdot g(-1) = 0 \wedge 1 = 0$ | ٩  |
| $f(x) = \{(2, 1), (-1, 2), (0, 0), (-2, 2), (3, -1)\}$<br>$g(x) = f(x^2 - 1) \rightarrow g(x) = \{(2, 0), (-1, -1), (0, -1), (-2, -1), (3, 1)\}$                                                                                                                                                                                                                                                                                                                                                                                  | ١٠ |
| $h(x) = f( x ) \rightarrow h(x) = \{(2, 2), (-1, 1), (0, 0), (-2, 2), (3, 3)\}$                                                                                                                                                                                                                                                                                                                                                                                                                                                   |    |