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$$y = \sqrt{x f(x)} \rightarrow x f(x) \geq 0$$

$$\begin{array}{ccccccc} & -4 & -\infty & 0 & 2 & \infty \\ & | & | & | & | & | \\ & - & + & - & + & - \end{array}$$

بر اساس جدول

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

✓

$$y = \sqrt{\frac{-x}{f(x)}} \rightarrow \frac{-x}{f(x)} \geq 0$$

$$\begin{array}{ccccccc} & -\varepsilon & -3 & 0 & 2 & \infty \\ & | & | & | & | & | \\ & - & + & - & + & - \end{array}$$

بر اساس جدول

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

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$$f(2) \Rightarrow f(2) - 2f(2) = \varepsilon - 4 + \varepsilon \rightarrow -f(2) = 2 \rightarrow f(2) = -2$$

$$f(-2) \rightarrow f(-2) - 2(-2) = (-2)^2 - 3(-2) + \varepsilon$$

$$f(-2) + \varepsilon = \varepsilon + 4 + \varepsilon$$

$$f(-2) = 10$$

✓

$$f(1) \rightarrow f(x) = 2x + 3 \rightarrow 2(1) + 3 = f(1) \rightarrow f(1) = 5$$

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

$$f(f(\infty)) + f(f(1)) = f(2) + f(5) = 7 + 2 = 9$$

✓

$$f(2) \rightarrow f(x) = 2x + 3 \rightarrow f(2) = 2(2) + 3 = 4 + 3 = 7$$

$$f(x) = ax^2 - bx + 2$$

$$f(x-1) \rightarrow f(x-1) = a(x-1)^2 - b(x-1) + 2$$

$$f(x-1) = ax^2 + a - 2ax - bx + b + 2$$

✓

$$f(x-1) - f(x) = 4x + 2$$

$$-2ax + b + a = 4x + 2$$

$$\begin{cases} a = -2 \\ a = -3 \end{cases}$$

$$\begin{cases} a + b = 2 \\ -3 + b = 2 \end{cases}$$

$$b = 5$$

$$a - b = -3 - 5 = -8$$

$$f(3) = (3)^2 - 3(3) + 1 = 9 - 9 + 1 = 1$$

$$f(-1) = (-1)^2 - 3(-1) + 1 = 1 + 3 + 1 = 5$$

$$f(2) = (2)^2 - 3(2) + 1 = 4 - 6 + 1 = -1$$

$$\frac{2f(3) + f(-1)}{f'(2)} = \frac{2 \times 1 + 5}{(-1)^2} = \frac{2+5}{1} = \frac{7}{1} = 7 \quad \text{P} \checkmark$$

$$f(x) \rightarrow \dots \rightarrow x_{n+1} = f(x) \rightarrow x(x) + 1 = 12 + 1 = 13$$

$$f(-2) \rightarrow \dots \rightarrow x^2 = f(x) \rightarrow (-2)^2 = 4$$

$$f(2) \rightarrow \dots \rightarrow x_{n+1} = f(x) \rightarrow x(2) + 1 = 4 + 1 = 5$$

$$\frac{3f(x) - 2f(-2)}{f'(2)} = \frac{3 \times 13 - 2 \times 4}{5} = \frac{39 - 8}{5} = \frac{31}{5} = \frac{31}{5} \quad \text{P} \checkmark$$

$$\frac{f(\overbrace{f(x)}^1) - f(\overbrace{f(3)}^2)}{\overbrace{f(1)}^4 - 2} = \frac{f(1) - f(2)}{4 - 2} = \frac{1 - 4}{2} = \frac{-3}{2} = -\frac{3}{2} \quad \text{P} \checkmark$$

$$f(\sqrt{3}-2) = \frac{(\sqrt{3}-2)^2 + 2(\sqrt{3}-2) + 9}{(\sqrt{3}-2)^2 + 2(\sqrt{3}-2) + 5} = \frac{3+4-4\sqrt{3}+2\sqrt{3}-4+9}{3+4-4\sqrt{3}+2\sqrt{3}-4+5} = \frac{8-2\sqrt{3}}{8-2\sqrt{3}} = 1 \quad \text{P} \checkmark$$

$$f(\overbrace{f(\sqrt{3}-2)}^2) = f(2)$$

$$f(2) = \frac{(2)^2 + 2(2) + 9}{(2)^2 + 2(2) + 5} = \frac{4+4+9}{4+4+5} = \frac{17}{13} = \frac{17}{13} \quad \text{P} \checkmark$$

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

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

$$(f(\sqrt{x}))^2 - f(x) = x^2 + \frac{1}{x^2} + 2 - x^2 - \frac{1}{x^2} = 2 \quad \text{P} \checkmark$$