

$$y = \sqrt{x f(x)} \rightarrow x f(x) \geq 0 \rightarrow \begin{array}{c} -5 \quad 0 \quad 2 \quad 5 \\ \hline \cancel{0} + \cancel{0} - \cancel{0} + \cancel{0} \\ \hline \end{array}$$

$$0 \quad 2,5 \quad -5 \rightarrow D_f = [-5, 0] \cup [2, 5]$$

✓

$$y = \sqrt{\frac{-x}{f(x)}} = \frac{-x}{f(x)} \geq 0 \rightarrow \begin{array}{c} -3 \quad 0 \quad 2 \quad 5 \\ \hline \cancel{0} + \cancel{0} - \cancel{0} + \cancel{0} \\ \hline \end{array}$$

حددار باشد

حالت اول: $f(x) < 0$ و $x < 0$
 حالت دوم: $f(x) > 0$ و $x > 0$

$D_f = (-\infty, -3) \cup (2, 5)$

I $f(x) - 2f(2) = x^2 - 3x + 6$
 II $f(-2) - 2f(1) = (-2)^2 - 3(-2) + 6 \Rightarrow \Rightarrow f(-2) = 10$
 III $f(2) - 2f(2) = 4 - 6 + 6 \Rightarrow f(2) = -2$
 IV $f(-2) = 10$

$$f(x) = \begin{cases} x - \sqrt{x+6} & x > 3 \\ 2x+3 & x \leq 3 \end{cases}$$

$f(f(5)) + f(f(1))$

II $f(5) = f(5 - \sqrt{5+6}) = f(2) \rightarrow f(2) = 4+3=7$

II $f(f(1)) = f(2+3) = f(5) = 5 - \sqrt{5+6} = 2 \Rightarrow 7+2=9$

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

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

$$f(x-1) - f(x) = ax^2 + a - 2ax - bx + b + 2 - ax^2 + bx - 2 = 4x + 2$$

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

$$\rightarrow -2ax = 4x \Rightarrow a = -2$$

$$-3x + b = 2 \Rightarrow b = 5$$

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

$$\frac{f(4) + f(-1)}{f'(1)}$$

2 ✓

$$I \quad f(4) = 16 - 16 + 1 = 1 \Rightarrow f(4) = 1$$

$$II \quad f(-1) = 1 - 4 + 1 = -2 \Rightarrow f(-1) = -2$$

$$III \quad f'(1) = 2x - 4 = -2 \Rightarrow f'(1) = -2$$

$$IV \quad \frac{1 + (-2)}{-2} = \frac{1}{2}$$

$$f(x) = \begin{cases} 3x+1 & x \geq 2 \\ x^2 & x < 2 \end{cases}$$

$$\frac{3f(2) - 2f(-2)}{f(1)}$$

2 ✓

$$I \quad f(2) = 3 \times 2 + 1 = 7 \Rightarrow f(2) = 7$$

$$II \quad f(-2) = (-2)^2 = 4 \Rightarrow f(-2) = 4$$

$$III \quad f(1) = 3 \times 1 + 1 = 4$$

$$IV \quad \frac{3 \times 7 - 2 \times 4}{4} = \frac{13}{4}$$

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

$$\frac{f(f(2)) - f(f(3))}{f(1) - 2}$$

2 ✓

$$I \quad \frac{f(1) - f(3)}{1 - 2} = 0$$

$$II \Rightarrow \frac{f(f(2)) - f(f(3))}{f(1) - 2} = 0$$

$$f(f(\sqrt{3}-2))$$

$$f(x) = x^2 + 3x + 9$$

$$I \quad f(\sqrt{3}-2) = (\sqrt{3}-2)^2 + 3(\sqrt{3}-2) + 9$$

$$= (3 - 4\sqrt{3} + 4) + 3\sqrt{3} - 6 + 9 = 10 - \sqrt{3}$$

2 ✓

$$II \quad f(2) = 4 + 6 + 9 = 19$$

$$(f(\sqrt{x}))^2 - f(x)$$

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

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