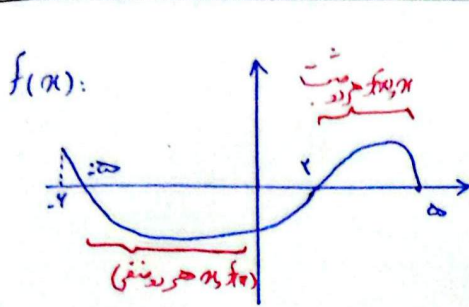


پ. ز. زمین



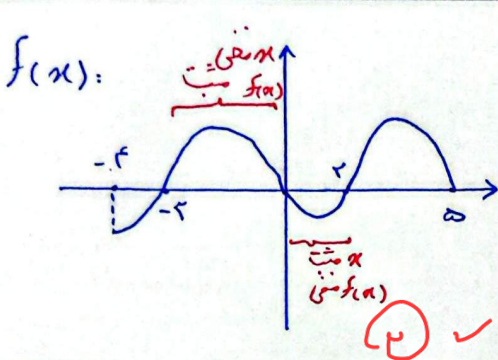
$$y = \sqrt{x f(x)}$$

$\Rightarrow x f(x) \geq 0 \rightarrow$ علامت x و $f(x)$ باید هم علامت باشند

$\Rightarrow Df = [-\infty, 0] \cup [2, \infty]$

پ. ✓

1



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

$\Rightarrow \frac{-x}{f(x)} \geq 0, f(x) \neq 0 \rightarrow$ علامت x و $f(x)$ باید مختلف باشند

$\Rightarrow Df = (0, 2) \cup (-2, 0)$

$\rightarrow 1, -1, -2 \rightarrow$ عدد صحیح

پ. ✓

2

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

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

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$$f(-2) - 2f(-2) = (-2)^2 - 2(-2) + 4 \Rightarrow f(-2) + 4 = 12 \Rightarrow f(-2) = 8$$

3

$$f(x) = \begin{cases} x - \sqrt{x+4} & x > 2 \\ 2x+2 & x \leq 2 \end{cases}$$

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$$\Rightarrow f(f(\infty)) + f(f(1)) = f(\infty - \sqrt{9}) + f(2 \times 1 + 2)$$

$$= f(7) + f(4) = (2 \times 2 + 2) + (\infty - \sqrt{\infty+4}) = 9$$

4

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

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

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

$$\Rightarrow (ax^2 - 2ax + a - bx + b + 2) - (ax^2 - bx + 2) = 4x+2$$

$$\Rightarrow -2ax + a + b = 4x+2 \xrightarrow{x=1} -2a + a + b = 4 + 2 \Rightarrow a - b = -6$$

5

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

$$\frac{f(2) + f(-1)}{f'(2)} = \frac{2(2^2 - 2 \times 2 + 1) + ((-1)^2 - 2(-1) + 1)}{(2^2 - 2 \times 2 + 1)^2} = \frac{2 + 2}{(-1)^2} = 4 \quad \checkmark$$

Ⓟ ✓

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

$$\frac{f(2) - f(-2)}{f'(2)} = \frac{2(2 \times 2 + 1) - 2((-2)^2)}{2 \times 2 + 1} = \frac{29 - 8}{5} = \frac{21}{5} \quad \checkmark$$

Ⓟ ✓

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

$$\frac{f(f(2)) - f(f(2))}{f(1) - 2} = \frac{f(1) - f(2)}{f(1) - 2} = \frac{4 - 4}{4 - 2} = \frac{0}{2} = 0 \quad \checkmark$$

Ⓟ ✓

$$f(x) = \frac{x^2 + 2x + 9}{x^2 + 2x + 2}$$

$$f(f(\sqrt{2} - 1)) = f\left(\frac{\sqrt{2} - 1 + \sqrt{2} - 1 + 9}{\sqrt{2} - 1 + \sqrt{2} - 1 + 2}\right) = f\left(\frac{7}{2}\right) = \frac{(\frac{7}{2})^2 + 2(\frac{7}{2}) + 9}{(\frac{7}{2})^2 + 2(\frac{7}{2}) + 2} = \frac{21}{14} \quad \checkmark$$

Ⓟ ✓

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

$$(f(\sqrt{x}))' - f(x) = \left((\sqrt{x})^2 + \frac{1}{(\sqrt{x})^2}\right)' - \left(x^2 + \frac{1}{x^2}\right) = 2x + \frac{1}{x^3} - \left(x^2 + \frac{1}{x^2}\right) = 2 \quad \checkmark$$

Ⓟ ✓