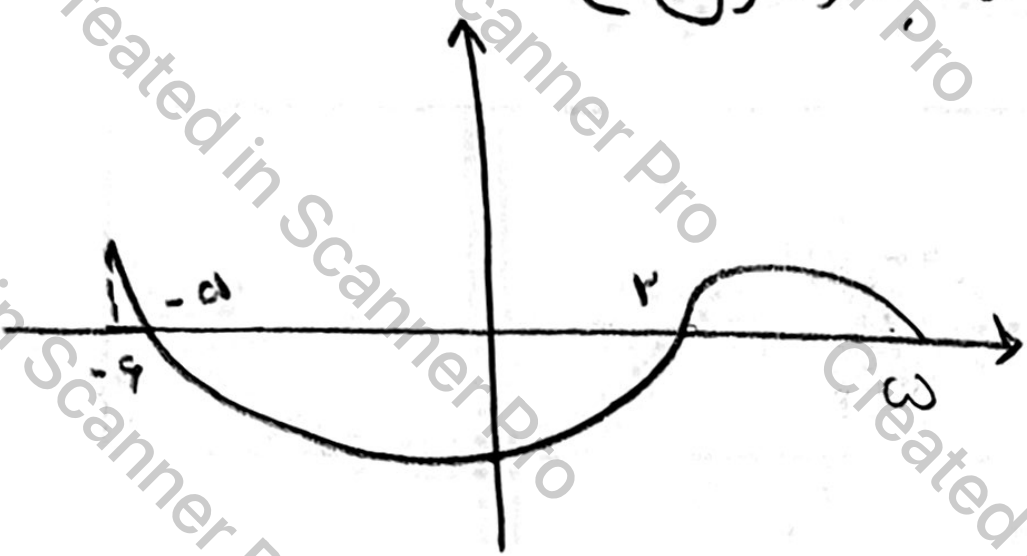


سنا قرا فانی

① ۲

$$[2, 5] \cup [-5, 0]$$

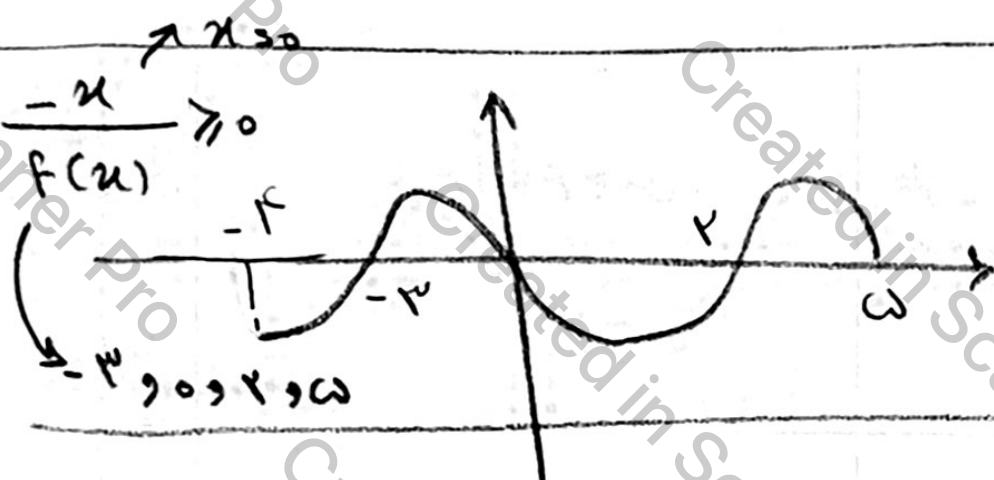
x	-5	0	2	5
y	-	+	-	+



② ۲

x	-3	0	2	5
y	-	+	+	+

$$[-3, 0) \cup (0, 2) \quad -2, -1, 1 \Rightarrow x=3$$



③ ۲

$$f(x) - 4f(2) = x^2 - 3x + 4$$

$$x=2 \rightarrow f(2) - 4f(2) = 4 - 6 + 4 \rightarrow f(2) = -2$$

$$x=-2 \rightarrow f(-2) + 4f(2) = 4 + 6 + 4 \Rightarrow f(-2) = 10$$

$$f(x) = \begin{cases} x - \sqrt{x+4} & ; x > 2 \\ 2x + 3 & ; x \leq 2 \end{cases}$$

④ ۲

$$f(f(5)) + f(f(1)) \rightarrow f(2) + f(5) = 9$$

⑤

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

$$= ax^2 + a - 2ax - bx + b + 2$$

$$ax^2 + a - 2ax = bx + b + 1 - ax^2 + bx - 2 \Rightarrow 4x + 2$$

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

$$a = -3$$

$$-3 + b = 2 \rightarrow b = 5$$

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

$$f(x) = \frac{x^2 + 5x + 6}{x^2 + 4x + 3} = \frac{(x+2)^2}{(x+1)(x+3)}$$

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

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

$$x - \frac{1}{x} = -2 \rightarrow \frac{x^2 - 1}{x} = -2 \rightarrow x^2 - 1 + 2x = 0 \rightarrow x^2 + 2x - 1 = 0 \quad (x+)$$

$$\frac{x^2}{x^2} + \frac{2x}{x^2} - \frac{1}{x^2} = \left(x - \frac{1}{x}\right)^2$$

$$f\left(x - \frac{1}{x}\right) = \left(x - \frac{1}{x}\right)^2 + 2 \rightarrow x^2 + 2 = 11$$

$$f(x) = \{(2, 0), (1, -4), (0, 2), (7, 1)\}$$

$$g(x) = \sqrt{9 - x^2}$$

$$\frac{f}{g} = \left(1, \frac{2}{\sqrt{5}}\right), \left(0, \frac{2}{\sqrt{5}}\right), \left(2, \frac{0}{\sqrt{5}}\right)$$

$$\frac{f}{g} = \left(0, \frac{3}{2}\right), \left(1, \frac{\sqrt{2}}{2}\right)$$

$$f(x) = \{(2, 1), (3, 4), (-5, 2), (1, -2)\}$$

$$2f(x) = \{(2, 2), (3, 8), (-5, 4), (1, -4)\}$$

$$f(x) + 1 = \{(2, 2), (3, 5), (-5, 3), (1, -1)\}$$

$$3f^2(x) + 1 = \{(2, 13), (3, 49), (-5, 13), (1, 13)\}$$

$$f(2x) = \{(1, 1), \left(\frac{3}{2}, 4\right), \left(-\frac{5}{2}, 2\right), \left(\frac{1}{2}, -2\right)\}$$

$$f(x) = \{(2, 3), (7, 2), (1, 4), (3, 1), (5, 2)\}$$

$$g(x) = \{(1, 0), (2, 1), (-1, 4), (-2, -3), (4, -1)\}$$

$$f - g = \{2, 4\}, \{3, 2\}, \{1, 4\}$$

$$\frac{2f}{g} = \{2, 4\}, \{3, -2\}, \{1, -1\}$$