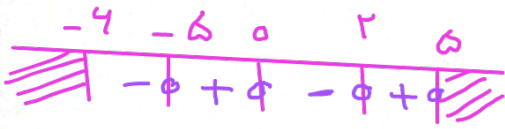
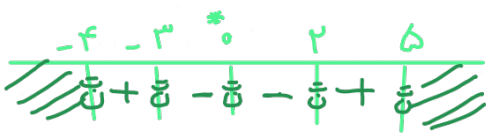


۱- برای آنکه زیر ادیکال نزدیک ترین مساوی منفی باشد باید x و $f(x)$ هم علامت باشند، پس:



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

$$\frac{-x}{f(x)} \geq 0 \rightarrow \frac{x}{f(x)} \leq 0$$



$$D_f = (-3, 2) - \{0\}$$

$$f(x) = k$$

$$f(x) = x^2 - 5x + 6 + 2k$$

$$f(x) = (x)^2 - 5(x) + 6 + 2k = k$$

$$x^2 - 5x + 6 + 2k = k$$

$$k = -x^2 + 5x - 6$$

$$f(x) = -x^2 + 5x - 6 \rightarrow f(x) = x^2 - 5x + 6 - 5x + 6 = f(x) = x^2 - 10x + 12$$

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

$$f(x) = \begin{cases} x - \sqrt{x+4} & x \geq 0 \\ x^2 + 5 & x < 0 \end{cases}$$

$$\textcircled{1} f(5) = 5 - \sqrt{5+4} = 2 \rightarrow f(2)$$

$$\textcircled{2} f(x) = x(x) + 5 = 5 + x^2$$

$$f(1) = 1 + 5 = 6$$

$$f(5) = 5 - \sqrt{9} = 2$$

$$f(f(5)) + f(f(1)) = 2 + 6 = 8$$

$$f(x-1) - f(x) = 6x + 2$$

$$f(1) - f(2) = \frac{15}{-10} \rightarrow 29 - (+10) = 19$$

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

$$-(b-x) = 10$$

$$-2b \leq 12$$

$$b \geq -6$$

$$|a \leq 1|$$

$$a - b \leq 2 \checkmark$$

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

$$-1 = 15 + f(2)$$

$$f(1) = 19$$

$$f(2) = 15 = b - a$$

$$f(x) = x^2 - x(1) = 0$$

$$f(1) = 1 - 1 = 0$$

$$f(x) = x^2 - x(1) = 0$$

$$f'(x) = 2x - 1$$

$$f'(1) = 2 - 1 = 1$$

$$f(x) = x^2 - x(1) = 0$$

$$\frac{-x + 0}{1} = \frac{-x}{1} = -x$$

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$$f(x) = x^2 - x(1) = 0$$

$$f(1) = 1 - 1 = 0$$

$$f(x) = x^2 - x(1) = 0$$

$$f'(x) = 2x - 1$$

$$f'(1) = 2 - 1 = 1$$

$$f(x) = x^2 - x(1) = 0$$

$$f(x) = x^2 - x(1) = 0$$

$$(x^2 + 1) = 0$$

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

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

$$\frac{f(f(x)) - f(x)}{f(x) - x} = \frac{0}{0} = 0$$

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

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

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

$$x^2 + x + 1$$

$$\sqrt{x} - x = x \rightarrow x + \sqrt{x} \rightarrow (x + \sqrt{x})^2 = (\sqrt{x})^2 \rightarrow x^2 + 2x\sqrt{x} + x = x \rightarrow x^2 + 2x\sqrt{x} = 0$$

$$f(\sqrt{x}) = \frac{(x^2 + 2x\sqrt{x}) + 1}{(x^2 + 2x\sqrt{x}) + 0} = \frac{-1 + 1}{-1 + 0} = \frac{0}{-1} = 0$$

$$f(f(\sqrt{x})) \rightarrow f(x) = \frac{x^2 + 2x\sqrt{x} + 1}{x^2 + 2x\sqrt{x} + 0} = \frac{x^2 + 2x\sqrt{x} + 1}{x^2 + 2x\sqrt{x}}$$

$$f'(x) = (f(\sqrt{x}))' - f(x)$$

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

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

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

۵- در ضابطه‌ی تابع به جای n مقدار $n-1$ قرار می‌دهیم:

$$f(n-1) = a(n-1)^2 - b(n-1) + 2 = an^2 - 2an - bn + a + b + 2$$

$$f(n-1) - f(n) = an^2 - 2an - bn + a + b + 2 - an^2 + bn - 2 = 4n + 2$$

$$-2an + a + b = 4n + 2 \rightarrow \begin{cases} -2a = 4 \rightarrow a = -2 \\ a + b = 2 \rightarrow b = 4 \end{cases} \rightarrow a - b = -6$$

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$$f(n) = n^2 - 2n + 1 \rightarrow \begin{cases} f(1) = 1^2 - 2(1) + 1 = 0 \\ f(-1) = (-1)^2 - 2(-1) + 1 = 4 \\ f(2) = 2^2 - 2(2) + 1 = 1 \end{cases}$$

$$\frac{2f(1) + f(-1)}{f'(1)} = \frac{2(0) + 4}{(-1)^2} = 4$$

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

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

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