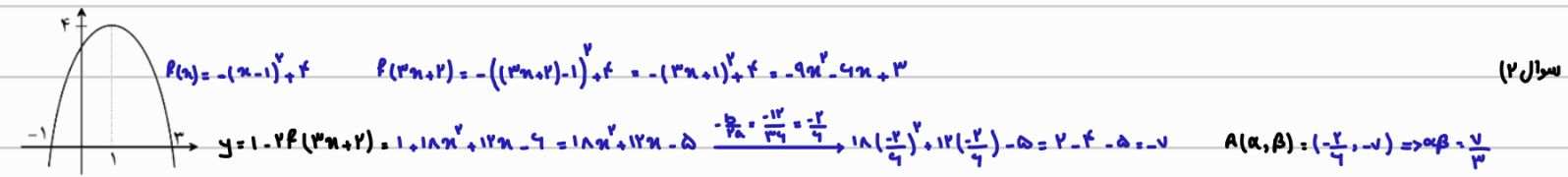


سوال (۱) سعی $y = -\frac{1}{3}x^2 + \frac{2}{3}x + 1$ داریم $a = -\frac{1}{3}$ است. روی داریم وقتی انتقال می دهیم a تغییر نمی کند. پس می توانیم معادله جدید را به کمک رأس معادله بنویسیم.

$$y = -\frac{1}{3}x^2 + \frac{2}{3}x + 1 \Rightarrow y = -\frac{1}{3}(x-4)^2 + 3 \xrightarrow{\text{ریشه ها}} 0 = -\frac{1}{3}(x-4)^2 + 3 \Rightarrow (x-4)^2 = 9 \rightarrow x-4 = \pm 3 \rightarrow x = 1 \text{ یا } x = 7$$



سوال (۳)

$$y = 3 - \sqrt{2x} \xrightarrow{\text{انتقال انتی}} y = 3 - \sqrt{2(n+1)} = 3 - \sqrt{2n+2} \xrightarrow{\text{تربینت به ۲}} y = 3 - \sqrt{2n+2} \Rightarrow y = -3 + \sqrt{2n+2} \xrightarrow{\text{انتقال عددی}} y = -3 + \sqrt{2n+2} + 5 = 2 + \sqrt{2n+2}$$

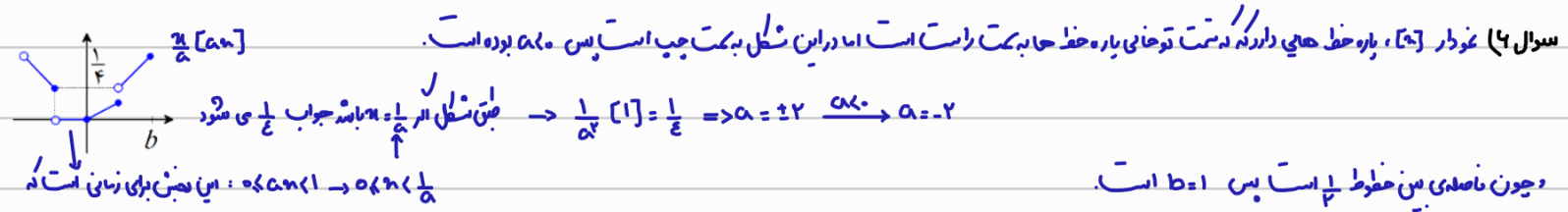
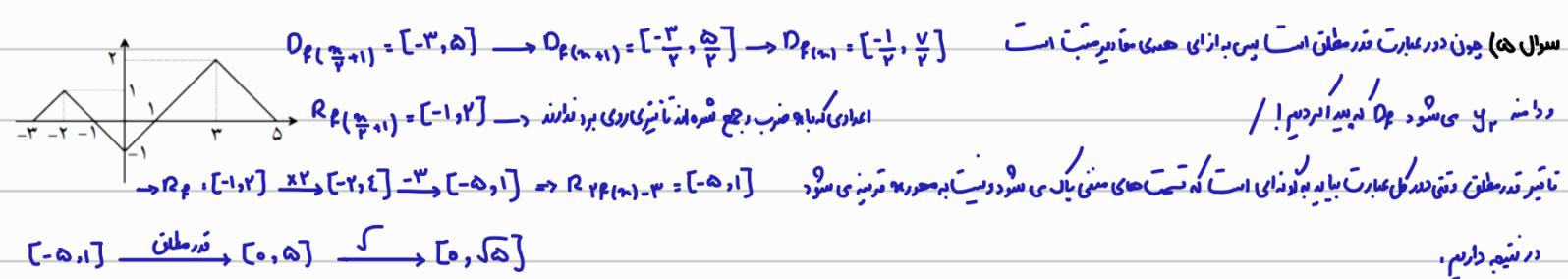
در اعدادی y صدی شود $Dy = x \pm 1$

$$f(x) = y \rightarrow 2 + \sqrt{2n+2} = \frac{y}{x} \rightarrow \sqrt{2n+2} = \frac{y}{x} - 2 \rightarrow 2n+2 = \frac{y^2}{x^2} - 4\frac{y}{x} + 4 \rightarrow 2n = \frac{y^2}{x^2} - 4\frac{y}{x} + 2 \rightarrow 2n = \frac{1}{x} \rightarrow n = \frac{1}{2x}$$

سوال (۴)

$$Df = [a, 4] \quad Dg = [-1, b] \quad y = f(n-1) + g(n+1) \rightarrow Dy = (-2, 5) \quad Dy = Dg(n+1) \cap Df(n-1) = (a+1, 5] \cap [-2, b-1) = (-2, 5) \Rightarrow$$

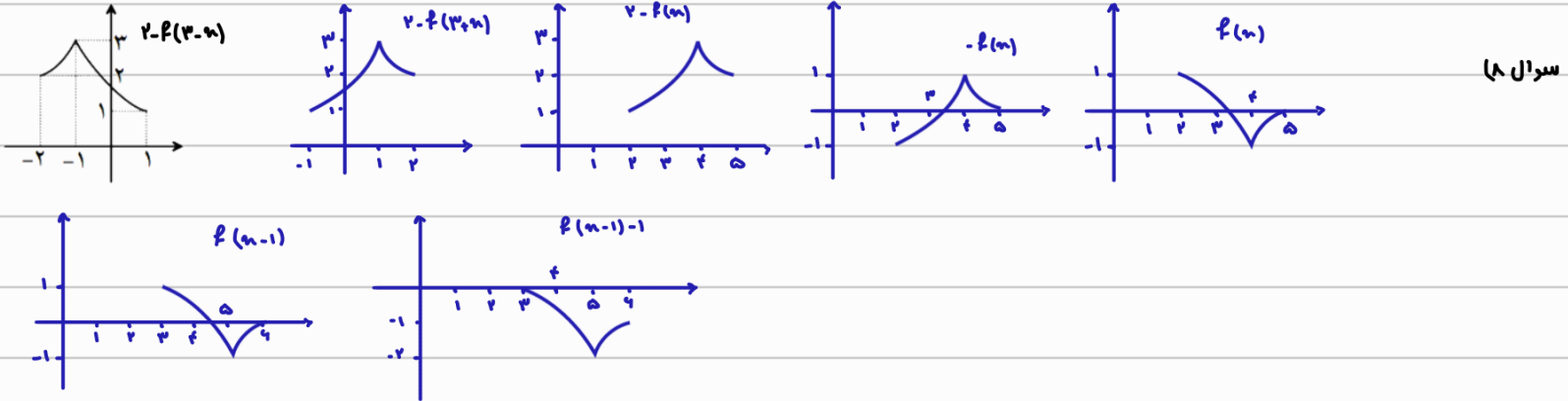
$$Df(n-1) = (a+1, 5] \quad Dg(n+1) = [-2, b-1) \quad / \quad a+1 = -2 \Rightarrow a = -3, \quad b-1 = 5 \Rightarrow b = 6 \Rightarrow a-b = -3-6 = -9$$



سوال (۷)

$$f(n) = h_{\frac{n}{2}} \xrightarrow{\text{تربینت به ۲}} h_{\frac{n}{2}+2} \xrightarrow{\text{تربینت به ۳}} h_{\frac{n}{2}+2+3} \xrightarrow{\text{تربینت به ۵}} h_{\frac{n}{2}+2+3+5} = h_{\frac{n}{2}+12}$$

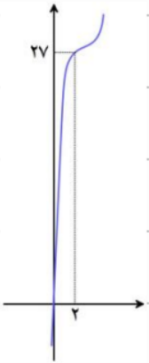
$$g(-14) + g(-42) = -h_{\frac{-14}{2}} + 3 - h_{\frac{-42}{2}} + 3 = -4 + 3 - 6 + 3 = -4$$



$$f(x) = \left| \frac{x+1}{x^2+1} \right| \xrightarrow{\text{نقطة ٢}} \left| \frac{x-x+1}{x(x-x)+1} \right| \xrightarrow{\text{نقطة ٢}} \left| \frac{x-1}{x^2-x} \right| + 1 = g(x) \quad x+g(x) < 0 \rightarrow x+1+\left| \frac{x-1}{x^2-x} \right| < 0$$

$$\begin{aligned} x+1+\frac{x-1}{x^2-x} = \frac{x^2-x}{x^2-x} < 0 \quad x+1+\frac{x-1}{x^2-x} = \frac{-(x-1)^2}{x^2-x} < 0 \quad x+1+\frac{x-1}{x^2-x} = \frac{x^2-x}{x^2-x} < 0 \\ \downarrow \quad \downarrow \quad \downarrow \\ \frac{-\sqrt{x}}{-1+1-1+} \quad \frac{1}{-1-1+} \quad \frac{-\sqrt{x}}{-1+1-1+} \end{aligned}$$

$$\Rightarrow x \in (-\infty, -\sqrt{x}) \cup (1, \frac{x}{x}) \cup (\frac{x}{x}, \sqrt{x})$$



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

$$0 = (x-1)^3 + 2x \rightarrow (x-1)^3 = -2x \rightarrow x-1 = -\sqrt[3]{2x} \Rightarrow x = -1 \quad / \quad 2x - f(x) = 0 \rightarrow 0 = -(x-1)^3 - 2x + 2x$$

$$\rightarrow (x-1)^3 = 1 \rightarrow x-1 = 1 \rightarrow x = 2 \quad / \quad f(x)(2x - f(x)) \gg 0 \rightarrow \frac{-1}{-1+1-1+} \rightarrow x = -1, 0, 1, 2, 3 \rightarrow \text{مطلوب}$$