

$$y = -\frac{1}{3}(x-4)^2 + 3 \xrightarrow{y=0} (x-4)^2 = 9 \rightarrow \begin{cases} x=1 \\ x=7 \end{cases}$$

طول رأس $\frac{-b}{2a} = \frac{-\frac{1}{3}}{\frac{1}{3}} = -1$ عرض رأس $= \frac{1}{3}(\frac{1}{3})^2 + 3 = \frac{1}{3}(\frac{1}{9}) + 3 = \frac{1}{27} + 3 = \frac{80}{27}$

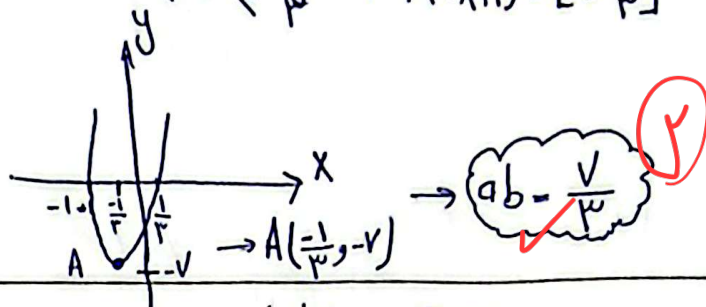
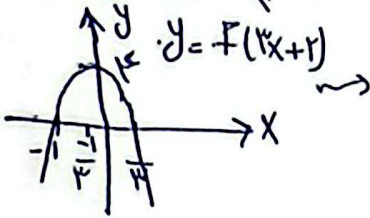
$\Delta x = 3 - \frac{1}{3} = \frac{8}{3}$ و $\Delta y = \frac{1}{27}$ $C' = C + \Delta y \Rightarrow C' = \frac{1}{27} + 3 = \frac{80}{27}$

$\Delta = b^2 - 4ac = (\frac{1}{3})^2 - 4(-\frac{1}{3})(\frac{80}{27}) = \frac{1}{9} + \frac{320}{27} = \frac{321}{27} = \frac{107}{9}$

$x = \frac{-b \pm \sqrt{\Delta}}{2a} \Rightarrow x_{1,2} = \frac{1}{3} \pm \sqrt{\frac{107}{9}} \Rightarrow x_1 = \frac{1 + \sqrt{107}}{3}, x_2 = \frac{1 - \sqrt{107}}{3}$

$\Delta x = \frac{1}{3} + \frac{8}{3} = 3 \Rightarrow x' = 3$

$-1 \leq x \leq 3 \Rightarrow -1 \leq 3x+2 \leq 3 \Rightarrow -1 \leq x \leq \frac{1}{3}$ $Df(3x+2) = [-1, \frac{1}{3}]$



$y = 3 - \sqrt{2x}$ یکطرفه و یکتا $y = 3 - \sqrt{2x+2}$ همیشه مثبت $y = \sqrt{2x+2} - 3$ همیشه منفی

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

$Df = (a, b]$ $a < x-1 \leq b \Rightarrow a+1 < x \leq b+1 \Rightarrow Df(x-1) = (a+1, b+1]$

$Dg = [-1, b)$ $-1 \leq x+1 < b \Rightarrow -2 \leq x < b-1 \Rightarrow Dg(x+1) = [-2, b-1)$

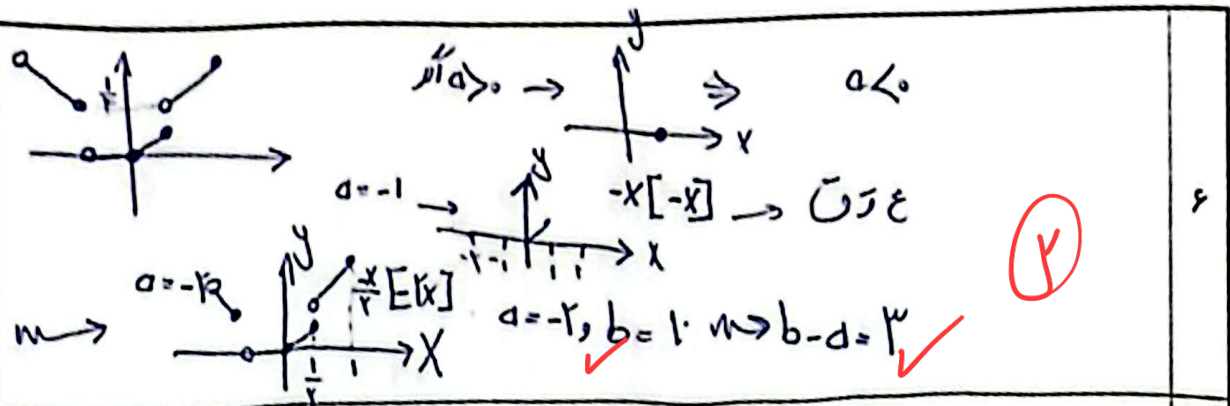
$[-2, b-1) \cap (a+1, b+1] = (-2, b)$ $a+1 = -2 \rightarrow a = -3$ $b-1 = b \rightarrow b = b$

$d-b = -9$

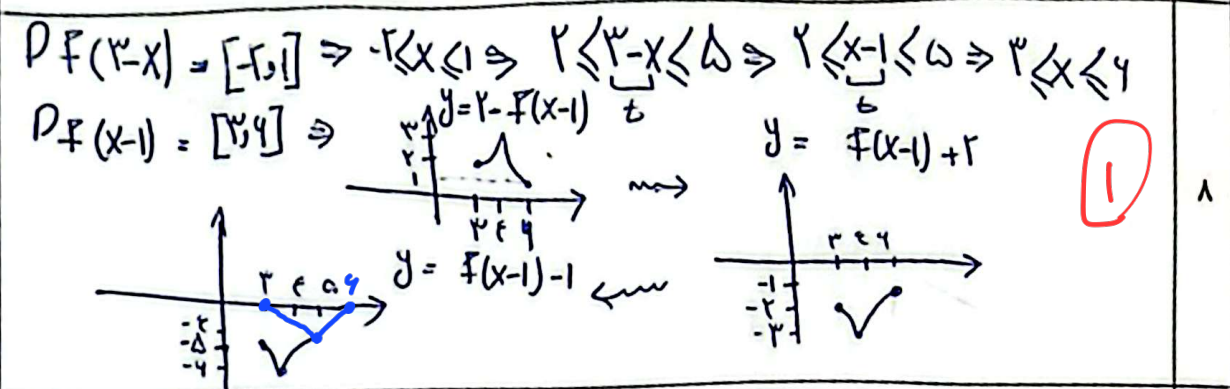
$-3 \leq x \leq 5 \Rightarrow -1 \leq \frac{x}{2} + 1 \leq 3 \Rightarrow Df(x) = [-1, 3]$

$y = f(x) \Rightarrow y = |2f(x) - 3|$ $Df = [-1, 3]$ $Rf = [1, \sqrt{10}]$

$R_f = [0, \sqrt{5}]$



$f(x) = \log_2 x \rightarrow f(2) = 1$
 $f(x) = \log_2(x+2)$
 $f(x) = -\log_2(x+2)$
 $g(x) = -\log_2(-x+2) + 2$
 $g(-1) + g(-4) = -\log_2 3 + 2 + -\log_2 6 + 2 = -4$



$f(x) = \frac{x+1}{2x+1} \rightarrow g(x) = \frac{x-1}{2x-3} + 1 \Rightarrow \frac{x-1}{2x-3} + x + 1 < 0$
 $\frac{x-1}{2x-3} + x + 1 < 0 \Rightarrow \frac{x-1 + (x+1)(2x-3)}{2x-3} < 0$
 $\frac{x-1 + 2x^2 - 3x - 2x + 3}{2x-3} < 0 \Rightarrow \frac{2x^2 - 4x + 2}{2x-3} < 0$
 $\frac{2(x-1)^2}{2x-3} < 0 \Rightarrow x < 1.5$
 $Df = (-\infty, 1.5) \cup (1.5, \infty)$

