

$$f(u+1) + f(u+2) = 3u + f(3)$$

باران سایی

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$$y = \sqrt{f(u) - u^2} \quad \text{بردار؟}$$

$$\text{if } u=1 \rightarrow f(3) + f(3) = 3 + f(3) \rightarrow f(3) = 3 \rightarrow f(u) = u$$

$$\text{آزمایش درستی} \rightarrow u=0 \rightarrow f(1) + f(2) = f(3) \rightarrow 1+2=3 \quad \checkmark$$

$$y = \sqrt{u - u^2} \rightarrow \text{بردار زیر رادیکال} \Rightarrow -u^2 + u = 0 \quad \begin{cases} u_{\text{ext}} = \frac{-b}{2a} = \frac{1}{2} \\ y_{\text{ext}} = \frac{1}{2} \end{cases}$$

$$R: (-\infty, \frac{1}{2}]$$

$$\Rightarrow R_f: [0, \frac{1}{2}]$$

$$f = f\left(\frac{a+b}{2}\right) \quad \text{مقدار}$$

$$R_f: [0, +\infty) - \{1\} \quad D_f: \mathbb{R} - \{a, b\}$$

$$f(u) = \frac{u^2 - 2u}{u+2}$$

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$$\Rightarrow \frac{u(u^2 - 2)}{u+2} \rightarrow \frac{u(u-2)(u+2)}{(u+2)}$$

$$= u(u-2) \Rightarrow u^2 - 2u = \begin{cases} u_{\text{ext}} = \frac{-b}{2a} = 1 \\ y_{\text{ext}} = -1 \end{cases}$$

$$\checkmark y \neq 1$$

$$u^2 - 2u \neq 1$$

$$u^2 - 2u - 1 \neq 0$$

$$\rightarrow (u-2)(u+2) \neq 0 \quad \begin{cases} u \neq -2 \\ u \neq 2 \end{cases}$$

$$R_f: [-1, +\infty) - \{1\}$$

$$D_f: \mathbb{R} - \{-2, 2\}$$

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

$$R_f: ?$$

$$D_f: [a, b]$$

$$y = \sqrt[3]{u^3 + au^2 + bu - 1}$$

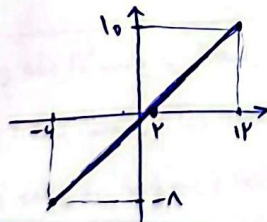
-3

$$\text{تویلی با اتحاد مکعب} \rightarrow u^3 - 4u^2 + 12u - 1 \Rightarrow (u-2)^3 \rightarrow \sqrt[3]{(u-2)^3} \Rightarrow u-2 \rightarrow f(u) = u-2$$

$$\text{درجه 3} \rightarrow$$

$$D_f: [-4, 12]$$

$$R_f: [-1, 10]$$



اعداد صحیح نمی تواند به توان کسری برسد

$$\rightarrow \frac{u+1}{1-u} \geq 0 \quad \begin{matrix} a+b=? \\ u & -1 & 1 \\ & 0 & 0 \end{matrix}$$

$$y_r = \frac{au^2 - 1}{u^2 + b}$$

$$\text{برابر! برد}$$

$$y_l = \left(\frac{u+1}{1-u}\right)^{\frac{1}{a}}$$

و اما

-4

$$D_f: [-1, 1)$$

$$\frac{au^2 - 1}{u^2 + b} \geq -1$$

$$\frac{au^2 - 1}{u^2 + b} < 1$$

$$u_{\text{max}}^2 \rightarrow \frac{a\infty - 1}{\infty + b} = 1 \rightarrow a = 1$$

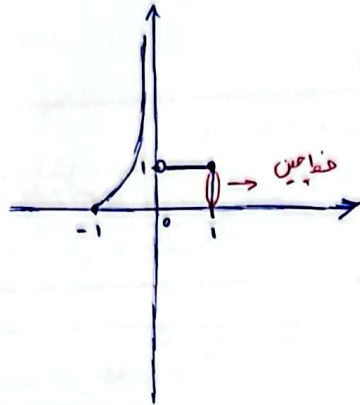
$$\Rightarrow a+b=2$$

$$u_{\text{min}}^2 \rightarrow \frac{-1}{b} = -1 \rightarrow \boxed{b=1}$$

$$? = [-1, 1] \quad \text{در بازه ی}$$

$$y = \frac{[u]}{u} + \frac{|u|}{u} \quad \text{نمودار}$$

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~~نمودار~~

$$u = 0^- \rightarrow \frac{-1}{0^-} = +\infty$$

$$u = 0^+ \rightarrow 0 + \frac{0^+}{0^+} = 1$$

$$u > 0 \rightarrow \frac{|u|}{u} = \frac{u}{u} = 1$$

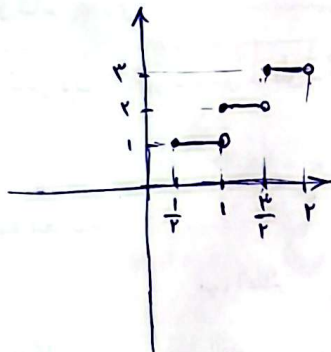
از چند پاره خط تشکیل شده؟  $[\frac{1}{2}, 2)$

در بازه ی

$$y = [u] + [u + \frac{1}{2}]$$

-4

از سه پاره خط تشکیل شده است.



$$u = \frac{1}{2} \Rightarrow 0 + 1 = 1$$

$$u = 1^- \Rightarrow 0 + 1 = 1$$

$$u = 1 \Rightarrow 1 + 1 = 2$$

$$u = \frac{3}{2}^- \Rightarrow 1 + 1 = 2$$

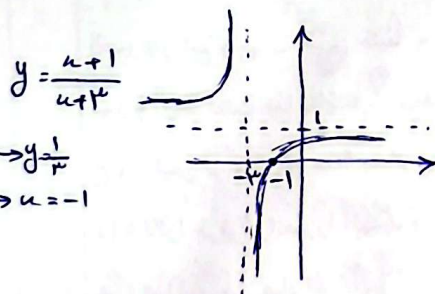
$$u = \frac{3}{2} \Rightarrow 1 + 2 = 3$$

$$u = 2^- \Rightarrow 1 + 2 = 3$$

a-b = ?

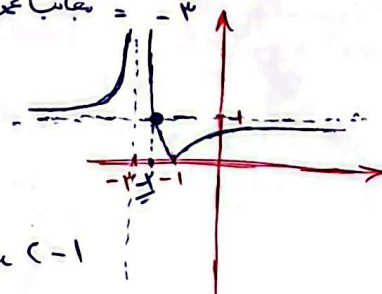
در بازه ی  $[\frac{u+1}{a+3}]$  که پایین تر از  $y=1$  است  $(b, +\infty)$  را می بینیم

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$$\text{مجاانب افقی} = \frac{a}{c} \Rightarrow \frac{1}{a} = 1 \Rightarrow a = 1$$

$$\text{مجاانب عمودی} = -3$$



$$\Rightarrow (b, +\infty) \Rightarrow \left| \frac{u+1}{u+3} \right| = 1 \Rightarrow -3 < u < -1$$

$$\frac{u+1}{u+3} = 1 \Rightarrow \frac{u+1}{u+3} = 1 \Rightarrow u+1 = u+3 \Rightarrow 0 = 2$$

$$-\left(\frac{u+1}{u+3}\right) = 1 \Rightarrow u+1 = -u-3 \Rightarrow 2u = -4 \Rightarrow u = -2$$

$$a = 1, b = -2$$

$$a-b = 1 - (-2) = 3$$

$$|u-2| + |y-1| = 3 \quad -1$$

$$\textcircled{1} \quad u \geq 2, y \geq 1 \rightarrow u-2+y-1=3 \Rightarrow y = -u+6$$

$$\textcircled{2} \quad u \leq 2, y \geq 1 \rightarrow -u+2+y-1=3$$

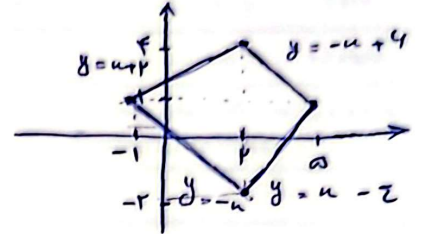
$$y = u+2$$

$$\textcircled{3} \quad u \geq 2, y \leq 1 \rightarrow u-2-y+1=3$$

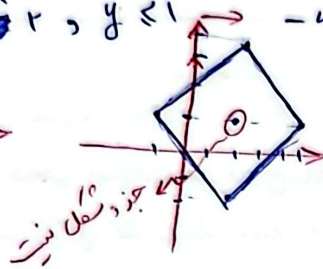
$$y = u-2$$

$$\textcircled{4} \quad u \leq 2, y \leq 1 \rightarrow -u+2-y+1=3$$

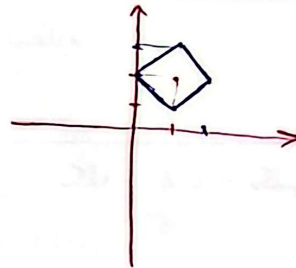
$$y = -u$$



شکل بیت



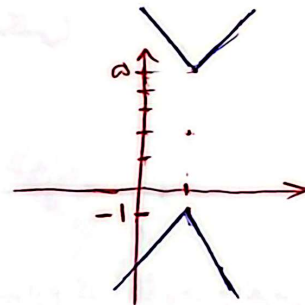
$$\text{الف) } |u-1| + |y-2| = 1$$



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$$\text{ب) } |u-1| - |y-2| = -3$$

$$u-1 \rightarrow |y-2| - |u-1| = 3$$



$$R_f: \mathbb{R}$$

$$y = 3u + |au + b|$$

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$$au + b \geq 0 \rightarrow y = (3+a)u + b$$

$$au + b < 0 \rightarrow y = (3-a)u - b$$

$$(3+a)(3-a) < 0 \rightarrow 9 - a^2 < 0 \quad a^2 > 9 \Rightarrow |a| > 3$$