

الف) $y = x^3 - 3x^2 + 3x \Rightarrow y = x^3 - 3x^2 + 3x - 1 + 1 \Rightarrow y = (x-1)^3 + 1$ $\Rightarrow y-1 = (x-1)^3 \Rightarrow \sqrt[3]{y-1} = x-1 \Rightarrow x = \sqrt[3]{y-1} + 1 \Rightarrow R_f = \mathbb{R}$ ب) $y = \frac{1}{x^2 - 2x} \Rightarrow y = \frac{1}{x(x-2)} \Rightarrow x=0 \vee x=2 \Rightarrow yx^2 - 2yx = 1$ $\Rightarrow x(yx - 2y) = 1 \Rightarrow yx - 2y = \frac{1}{x} \Rightarrow yx - \frac{1}{x} = 2y \Rightarrow x=0 \Rightarrow \frac{1}{x} = \frac{1}{0} = \infty$ $\Rightarrow x=2 \Rightarrow 2y - \frac{1}{2} = 2y \Rightarrow -\frac{1}{2} \neq 0 \Rightarrow R_f = \mathbb{R} - \{0, \frac{1}{2}\}$... پاس نمی‌دهد	۱
الف) $y = x^2 - 4x + 10 \Rightarrow \Delta > 0 \Rightarrow x_{min} = \frac{b}{2a} = 2 \Rightarrow y_{min} = 6 \Rightarrow R_f = [6, +\infty)$ ب) $y = -x^2 + 4x + 3 \Rightarrow \Delta > 0 \Rightarrow x_{max} = \frac{b}{2a} = 2 \Rightarrow y_{max} = 11 \Rightarrow R_f = (-\infty, 11]$ ج) $y = \sqrt{x^2 - 4x + 3} \Rightarrow \Delta > 0 \Rightarrow x_{min} = \frac{b}{2a} = 2 \Rightarrow y_{min} = -1 \Rightarrow R_f = [-1, +\infty)$ د) $y = \sqrt{4x - x^2} \Rightarrow \Delta < 0 \Rightarrow x_{max} = \frac{b}{2a} \Rightarrow x = 2 \Rightarrow y_{max} = 2 \Rightarrow R_f = [0, 2]$ $\Rightarrow R_f = [0, 3]$	۲
الف) $y = x^3 - 2x^2 + 2x + 1 \Rightarrow R_f = \mathbb{R}$ ب) $y = x^4 - 4x^2 + 3 \Rightarrow R_f = \mathbb{R}$ ج) $y = \sqrt{x^4 - 4x^2 + 3} \Rightarrow R_f = [0, +\infty)$ د) $y = (x^2 - 4x + 3)^2 \Rightarrow R_f = [0, +\infty)$ چون توان ۲ است به ازای هر مقدار x عددی مثبت در اختیار داریم $\Rightarrow R_f = [0, +\infty)$	۳
الف) $y = \frac{3x+1}{x-2} \Rightarrow R_f = \mathbb{R} - \{3\}$ ب) $y = \frac{2x+1}{x+1} \Rightarrow R_f = \mathbb{R} - \{2\}$	۴
الف) $y = \sqrt{\frac{x+1}{x-1}} \Rightarrow y^2 = \frac{x+1}{x-1} \Rightarrow y^2x + y^2 = x+1 \Rightarrow y^2x - x = 1 - y^2$ $\Rightarrow x(y^2 - 1) = 1 - y^2 \Rightarrow x = \frac{1 - y^2}{y^2 - 1} \Rightarrow R_f = \mathbb{R} - \{\pm\sqrt{2}\} \Rightarrow R_f = [0, +\infty) - \{\sqrt{2}\}$ ب) $y = \sqrt{\frac{3x+1}{2-x}} \Rightarrow y^2 = \frac{3x+1}{2-x} \Rightarrow 2y^2 - y^2x = 3x+1 \Rightarrow 3x + y^2x = 2y^2 - 1$ $\Rightarrow x(3 + y^2) = 2y^2 - 1 \Rightarrow x = \frac{2y^2 - 1}{3 + y^2} \Rightarrow R_f = \mathbb{R} \Rightarrow R_f = [0, +\infty)$ مقدار مثبت	۵

الف) $y = \frac{x-3}{x+1}$

ب) $y = \frac{x-1}{x+2}$

۱) $y = -1$ (میانگین نام)

۲) $y = 1$ (میانگین نام)

۳) $x = 0 \Rightarrow y = -3$

۴) $x = -2$

۵) $x = 0 \Rightarrow y = -1/2$

الف) $\sin x + \frac{1}{\sin x} = y \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$ ✓

ب) $y = \frac{x^4+1}{x^3} \Rightarrow x^3 + \frac{1}{x^3} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$ ✓

ج) $y = \frac{\sqrt[3]{x^3+1}}{\sqrt[3]{x}} \Rightarrow y = \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}} \Rightarrow R_f = (-\infty, -2] \cup [2, +\infty)$ ✓

د) $y = \sqrt{x} + \frac{1}{\sqrt{x}} \Rightarrow R_f = [2, +\infty)$ ✓

الف) $y = x^2 + \frac{1}{x^2+3} \Rightarrow x=0 \Rightarrow y = \frac{1}{3} \Rightarrow R_f = [\frac{1}{3}, +\infty)$ ✓

ب) $y = \frac{x^2+5}{\sqrt{x^2+4}} \Rightarrow \frac{x^2+4+1}{\sqrt{x^2+4}} \Rightarrow \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}}$

$x=0 \Rightarrow \sqrt{4} + \frac{1}{\sqrt{4}} \Rightarrow 2 + \frac{1}{2} = \frac{5}{2}$

$R_f = [\frac{5}{2}, +\infty)$

$y = |x-3| + |2x+4|$

$x=0 \Rightarrow y=7$

$x=3 \Rightarrow y=13$

$x=-\frac{4}{2} \Rightarrow y=\frac{13}{2}$

$x=4 \Rightarrow y=17$

$x=-1 \Rightarrow y=5$

$x=-2 \Rightarrow y=7$

$x=-3 \Rightarrow y=11$

سوال لغت به روش

چند ضابطه ای بدون نه نمودار

الف) $y = |x-2| + |2x+2| \Rightarrow x=2, x=-1$

$y = \begin{cases} x-2+2x+2 & x > 2 \\ 2-x+2x+2 & -1 \leq x \leq 2 \\ x-2-2x-2 & x < -1 \end{cases} \Rightarrow \begin{cases} 3x & x > 2 \\ x+4 & -1 \leq x \leq 2 \\ -x-4 & x < -1 \end{cases}$

ب) $y = |2x-2| - |x+1|$

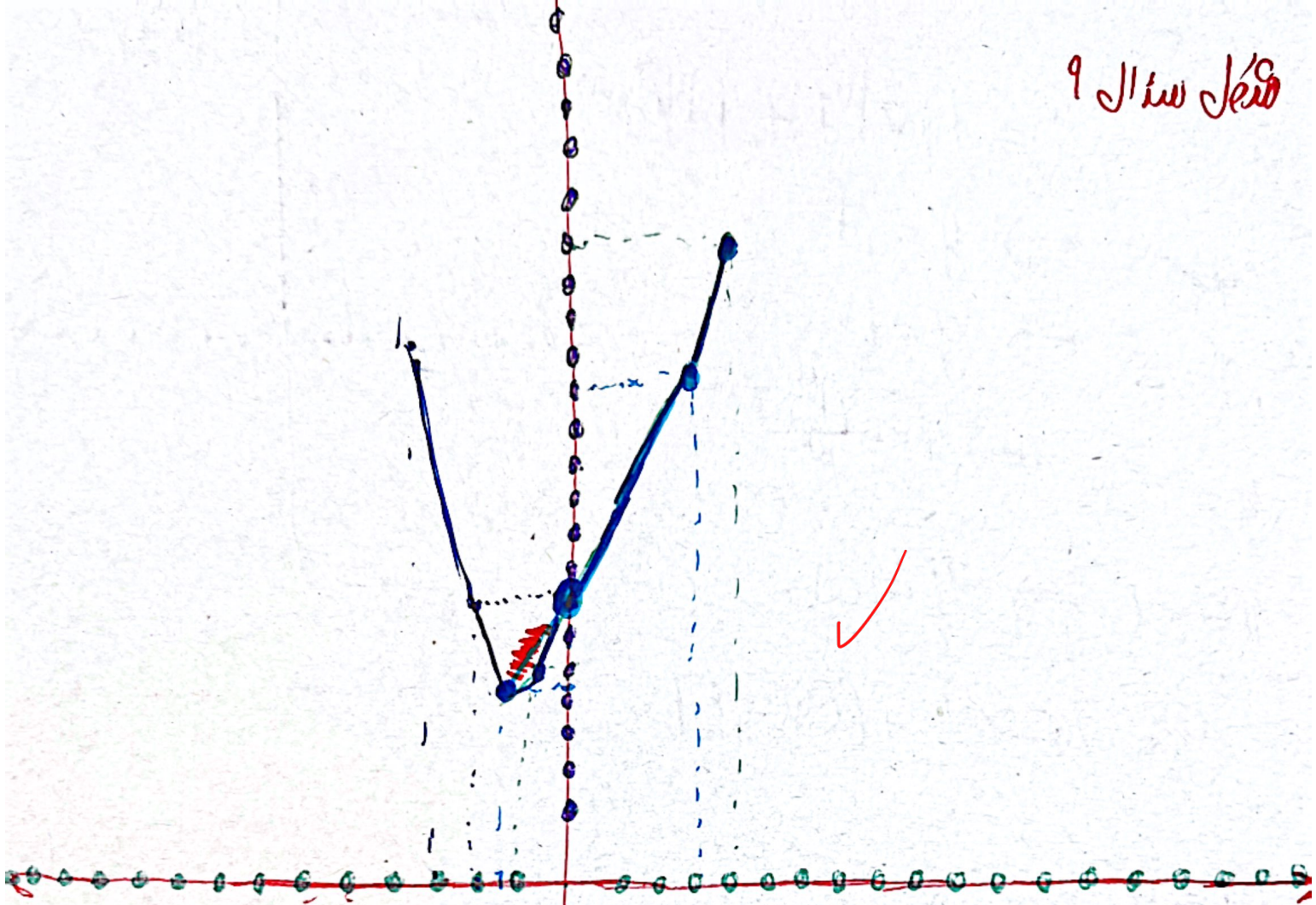
$x=1, x=-1$

$y = \begin{cases} 2x-2-x-1 & x > 1 \\ -2x+2-x-1 & -1 \leq x \leq 1 \\ -2x+2+x+1 & x < -1 \end{cases} \Rightarrow \begin{cases} x-3 & x > 1 \\ -3x+1 & -1 \leq x \leq 1 \\ -x+3 & x < -1 \end{cases}$

$R_f = [-2, +\infty)$ ✓

این قسمت به نام به صورت کامل شکلاتی راس مقید ام

سوال 9



$$\frac{u = -c \Rightarrow 11}{u = -r \Rightarrow 17}$$

$$\frac{a = -1 \Rightarrow y = \omega}{y}$$

$$y = |x - \omega| + |y - \omega| + \epsilon$$

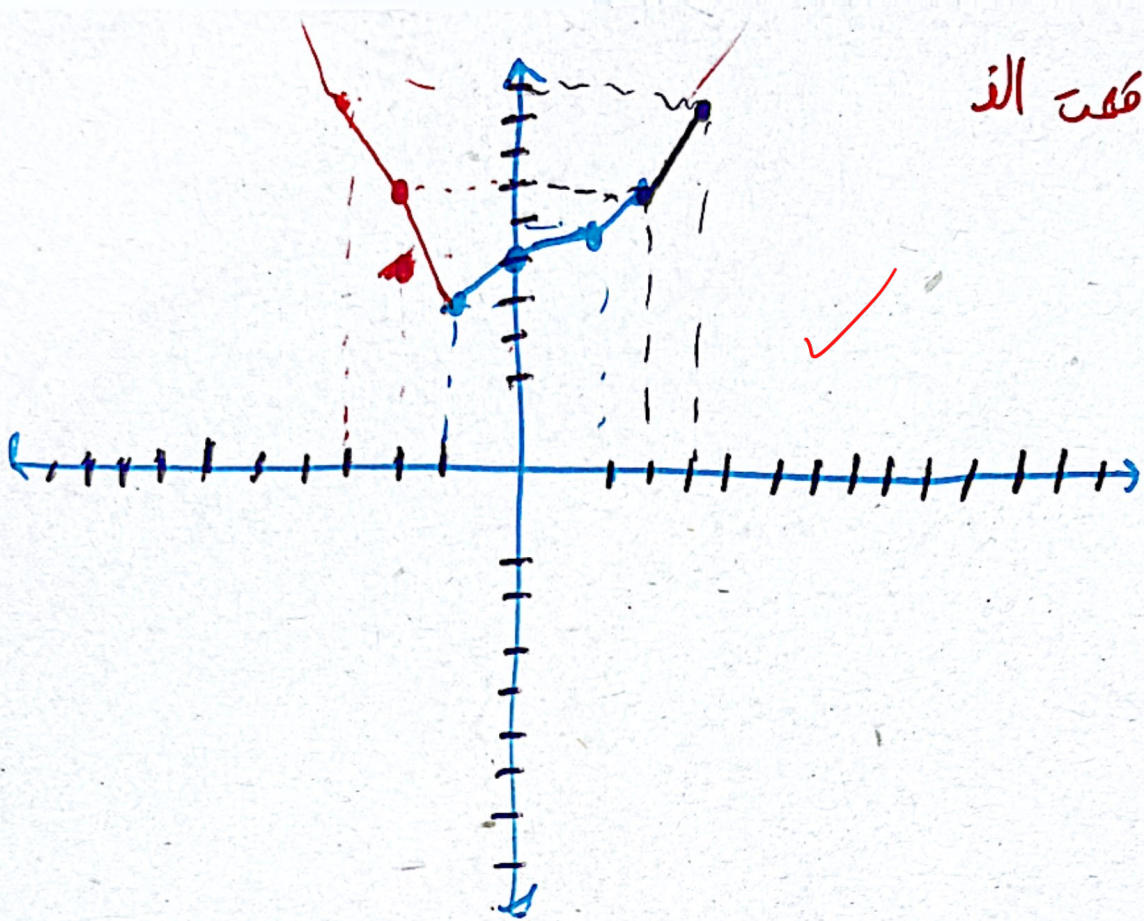
$$\frac{a = 0 \Rightarrow y = 17}{y}$$

$$\frac{a = \omega \Rightarrow y = 17}{y}$$

$$\frac{x = \omega \Rightarrow y = 17}{y}$$

$$\frac{a = \epsilon \Rightarrow y = 17}{y}$$

سؤال ما بعد الذ



$$x = 2 \Rightarrow y = 4$$

$$x = 1 \Rightarrow y = 3$$

$$x = 0 \Rightarrow y = 2$$

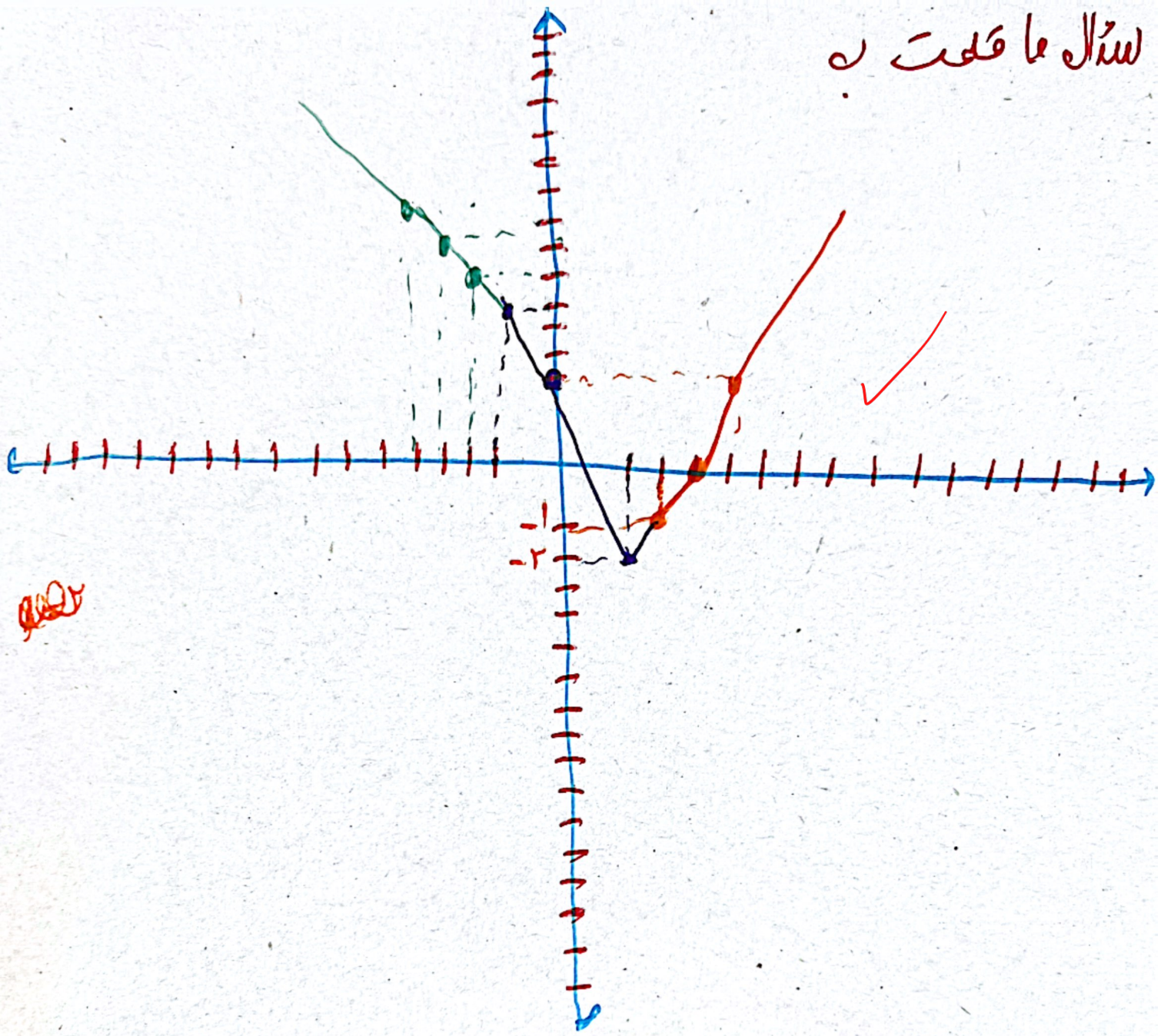
$$x = 1 \Rightarrow y = 0$$

$$x = 2 \Rightarrow y = 4$$

$$x = -2 \Rightarrow y = 4$$

$$x = -2 \Rightarrow y = 9$$

سؤال ما قلعت بـ



$x=2 \Rightarrow y=-1$
 $x=3 \Rightarrow y=0$
 $x=4 \Rightarrow y=1$

$x=-1 \Rightarrow y=4$
 $x=0 \Rightarrow y=1$
 $x=1 \Rightarrow y=-2$

$x=-2 \Rightarrow y=2$
 $x=-3 \Rightarrow y=7$
 $x=-4 \Rightarrow y=6$