

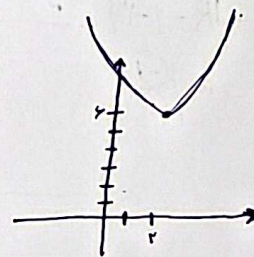
الف) $x^3 - 3x^2 + 3x = (x-1)^3 + 1 \rightarrow y-1 = (x-1)^3$

$\xrightarrow{\sqrt[3]{\cdot}} \sqrt[3]{y-1} + 1 = x \xrightarrow{\text{دومین نسبت}} R_f = \mathbb{R}$ ✓

ب) $y = \frac{1}{x^2 - 2x} \rightarrow yx^2 - 2yx - 1 = 0 \xrightarrow{\Delta} x = \frac{2y \pm \sqrt{\Delta}}{2y}$

$\rightarrow \Delta \geq 0 \sim 4y^2 + 4y \geq 0 \rightarrow 4y(y+1) \geq 0$
 $\downarrow \quad \downarrow$
 $0 \quad -1$

$R_f = (-\infty, -1] \cup [0, +\infty)$

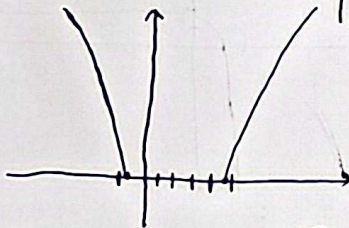


الف) $y = x^2 - 4x + 6 \rightarrow \text{ext} \begin{cases} \frac{b}{2a} \rightarrow (2) \\ \frac{\Delta}{4a} \rightarrow (4) \end{cases}$

ب) $y = -x^2 + 2x + 3 \rightarrow \text{ext} \begin{cases} (3) \\ (12) \end{cases}$
 $-(x^2 - 2x - 3)$

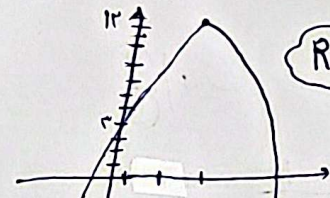
$R_f = [2, +\infty)$ ✓

ج) $y = \sqrt{x^2 - 5x - 3} \rightarrow \text{ext} \begin{cases} (2) \\ (-7) \end{cases}$



$[-7, +\infty)$

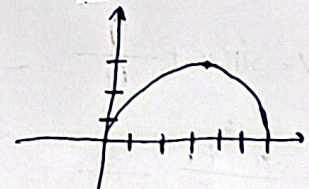
$R_f = [0, +\infty)$ ✓



$R_f = (-\infty, 12]$ ✓

د) $y = \sqrt{4x - x^2} \rightarrow \text{ext} \begin{cases} (3) \\ (1) \end{cases}$

$(-\infty, 9] \xrightarrow{\sqrt{\cdot}} R_f = [0, 3]$ ✓



الف) $y = x^2 - 5x^2 + 2x + 1 \rightarrow R_f = \mathbb{R}$ ✓

ب) $y = x^5 - 2x^4 + 3x + 2 \rightarrow R_f = \mathbb{R}$ ✓

ج) $y = \sqrt{x^5 - 2x^4 + 3x + 1} \rightarrow \mathbb{R} \xrightarrow{\sqrt{\cdot}} R_f = [0, +\infty)$ ✓

د) $y = (x^5 - 5x^4 + 3x + 1)^2 \rightarrow \mathbb{R} \xrightarrow{\sqrt{\cdot}} R_f = [0, +\infty)$ ✓

$R_f = [0, 3]$

الف) $y = \frac{3x+1}{x-2} \xrightarrow{IR - \{\frac{1}{3}\}} R_f = IR - \{3\}$ ✓

(۲)

(۴)

ب) $y = \frac{2x+1}{x+1} \xrightarrow{IR - \{\frac{1}{2}\}} R_f = IR - \{2\}$ ✓

الف) $y = \sqrt{\frac{3x+4}{x+1}} \rightarrow IR - \{2\} \xrightarrow{\sqrt{}} [0, +\infty) - \{\sqrt{2}\} = R_f$ ✓

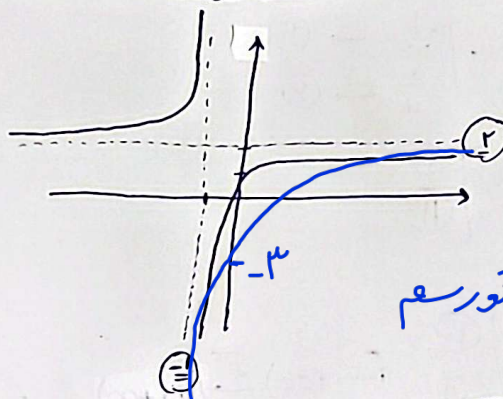
(۲)

(۵)

ب) $y = \sqrt{\frac{3x+1}{2-x}} \rightarrow IR - \{-3\} \xrightarrow{\sqrt{}} [0, +\infty) = R_f$ ✓

عانب | $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$

الف) $y = \frac{2x-3}{x+1}$



عانب ۲ = ریشه خارج
عانب انی = $\left\{ \frac{d}{c} \right\}$

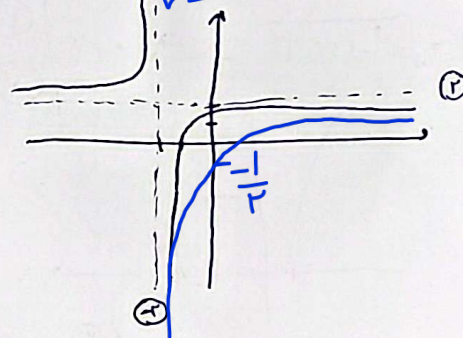
(۶)

(۱.۵)

عانب | $\begin{pmatrix} -1 \\ 2 \end{pmatrix}$

ب) $y = \frac{2x-1}{x+2}$

محله بر حفره مغودار با
محدوده ضایع همه تورسم



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

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

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

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

(۲)

(۷)

الف) $y = x^2 + \frac{1}{x^2+3} \xrightarrow{+3, -3} (x^2+3) + \frac{1}{(x^2+3)} - 3 \rightarrow [\frac{1}{3}-3, +\infty)$ (۲) (۱)

$\rightarrow R_f = [\frac{1}{3}, +\infty)$ ✓

ب) $y = \frac{x^2+5}{\sqrt{x^2+5}} = \frac{(x^2+5)+1}{\sqrt{x^2+5}} \rightarrow \sqrt{x^2+5} + \frac{1}{\sqrt{x^2+5}} \rightarrow R_f = [2/\sqrt{5}, +\infty)$ ✓

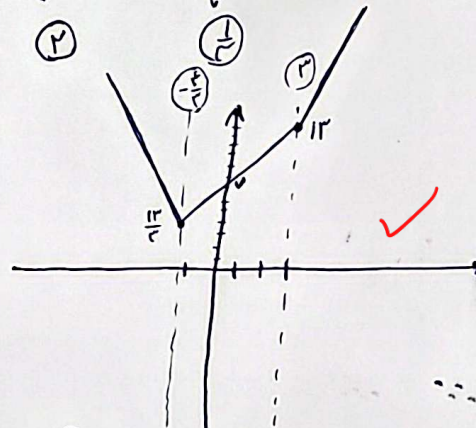
$y = |x-2| + |3x+5|$

نقطه‌های بحرانی: $x = -\frac{5}{3}, x = 2$

برای $x < -\frac{5}{3}$: $y = -x+2-3x-5 = -4x-3$

برای $-\frac{5}{3} < x < 2$: $y = -x+2+3x+5 = 2x+7$

برای $x > 2$: $y = x-2+3x+5 = 4x+3$



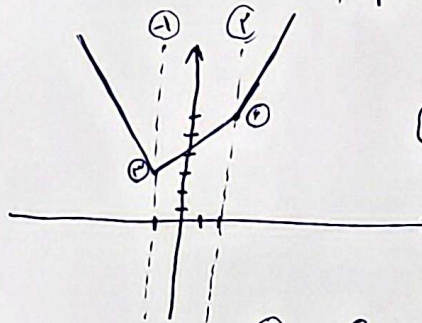
الف) $y = |x-2| + |2x+2|$

نقطه‌های بحرانی: $x = -1, x = 2$

برای $x < -1$: $y = -x+2-2x-2 = -3x$

برای $-1 < x < 2$: $y = -x+2+2x+2 = x+4$

برای $x > 2$: $y = x-2+2x+2 = 3x$



$R_f = [2, +\infty)$ ✓

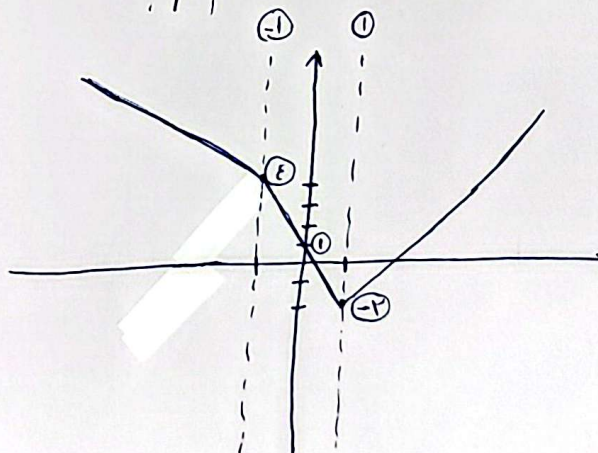
ب) $y = |2x-2| - |x+1|$

نقطه‌های بحرانی: $x = -1, x = 1$

برای $x < -1$: $y = -2x+2-(-x-1) = -x+3$

برای $-1 < x < 1$: $y = -2x+2-(-x+1) = -x+1$

برای $x > 1$: $y = 2x-2-(-x-1) = 3x-1$



$R_f = [-2, +\infty)$ ✓