

الف) $y = x^3 - 3x^2 + 3x - 1 + 1 \rightarrow y = (x-1)^3 + 1 \rightarrow (x-1)^3 = y-1 \rightarrow x-1 = \sqrt[3]{y-1}$
 $\rightarrow x = \sqrt[3]{y-1} + 1 \rightarrow R_f = \mathbb{R}$

ب) $\frac{1}{y} = x^2 - 2x + 1 - 1 \rightarrow (x-1)^2 - 1 = \frac{1}{y} \rightarrow (x-1)^2 = \frac{1+y}{y} \rightarrow x = \sqrt{\frac{1+y}{y}} + 1$
 $R_f = (-\infty, -1] \cup (0, +\infty)$

$\frac{y}{1} + \frac{-1}{1} = \frac{0}{1} + \frac{0}{1}$

الف) $x_s = \frac{b}{a} = \frac{4}{1} = 4$
 $y_s = 4 \rightarrow R_f = [4, +\infty)$

ب) $x_s = \frac{-4}{-1} = 4$
 $y_s = 12 \rightarrow R_f = (-\infty, 12]$

ج) $x_s = \frac{4}{1} = 4$
 $y_s = -1 \rightarrow [-1, +\infty) \rightarrow [0, +\infty) = R_f$

د) $x_s = 3$
 $y_s = 9 \rightarrow (-\infty, 9] \rightarrow [0, 3] = R_f$

الف) $\mathbb{R} = R_f$

ب) $\mathbb{R} = R_f$

ج) $\mathbb{R} \rightarrow [0, +\infty) = R_f$

د) $\mathbb{R} \rightarrow [0, +\infty) = R_f$

الف) $R_f = \mathbb{R} - \{3\}$

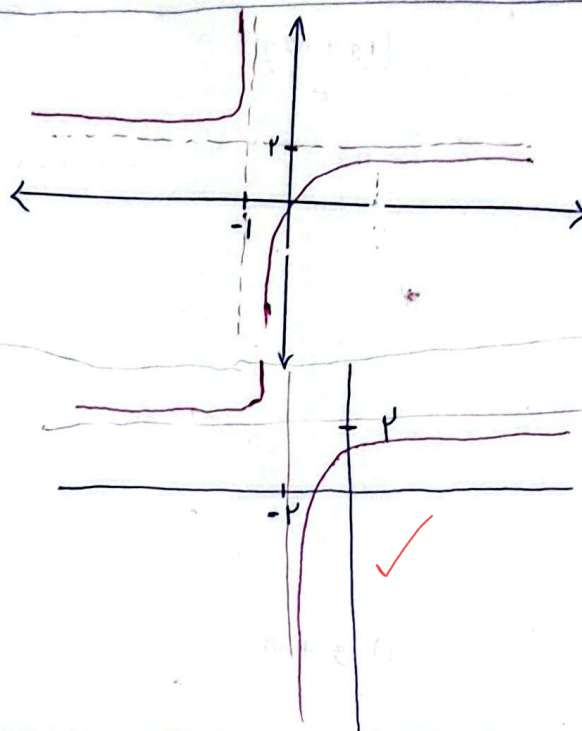
ب) $R_f = \mathbb{R} - \{2\}$

الف) $\mathbb{R} - \{1\} \rightarrow R_f = [0, +\infty) - \{1\}$

ب) $\mathbb{R} - \{\frac{1}{2}\} \rightarrow R_f = [0, +\infty) - \{\sqrt{\frac{1}{2}}\}$

$R = \sqrt{\mathbb{R} - \{1\}} \Rightarrow R = [1, +\infty)$

الف) $\frac{2x-3}{x+1} \rightarrow$ جانب قائم $= -1$
 جانب افقي $= 2$



ب) $\frac{2x-1}{x+2} \rightarrow$ جانب قائم $= -2$
 جانب افقي $= 2$

الف) $(-\infty, -2] \cup [2, +\infty) = R_f$

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

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

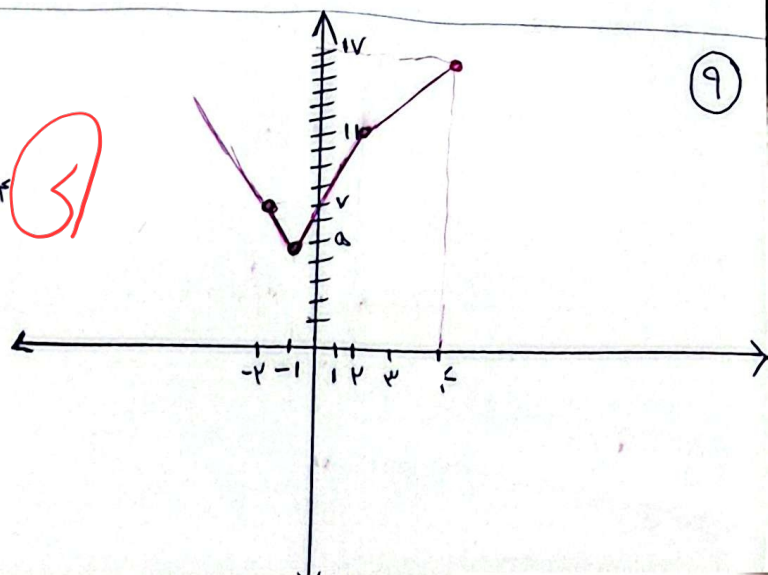
د) $\sqrt{x} + \frac{1}{\sqrt{x}} = y \rightarrow R_f = [2, +\infty)$

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

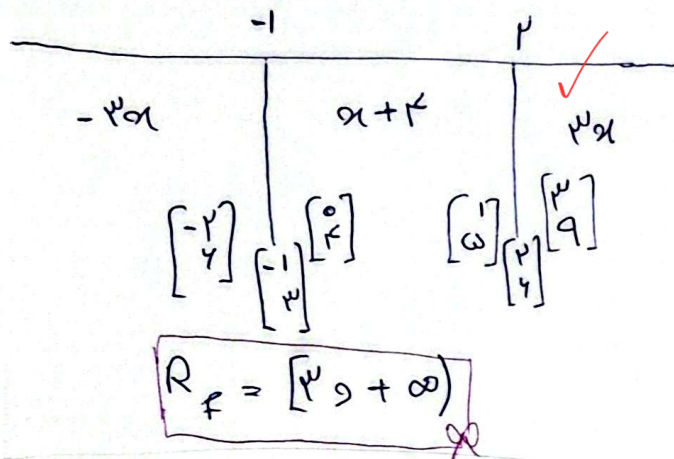
ب) $\sqrt{x^2 + 4} + \frac{1}{\sqrt{x^2 + 4}} = y \rightarrow R_f = [\frac{5}{2}, +\infty)$

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

$-\frac{x}{3}$		x	
$-x+3-3x-4$	$-x+3+3x+4$	$x-3+3x+4$	$x-3+3x+4$
$-4x-1$	$2x+7$	$4x+1$	$4x+1$
$[-\frac{1}{4}, \frac{7}{2}]$	$[\frac{7}{2}, \frac{1}{4}]$	$[\frac{1}{4}, \frac{1}{4}]$	$[\frac{1}{4}, \frac{1}{4}]$



الف) $y = |x-2| + |2x+2|$



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ب) $y = |2x-2| - |x+1|$

