

(ب)
 $y^2 - 2y - 150$
 $4y^2 + 4y \geq 0$
 $\Delta \geq 0$
 $y^2(y+1) \geq 0$
 $\frac{-1 \pm \sqrt{1+4}}{2} \quad R_f = (-\infty, -1] \cup [0, +\infty)$

(الف)
 $(x-1)^2 \geq y-1$
 $x = \sqrt{y-1} + 1$
 $R_f = R$

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(ج)
 $y_{\max} = -1$
 $R_f = \sqrt{-y+100} = [0, +\infty)$

(الف)
 $y_{\max} = \frac{4}{20} = 2$
 $y_{\max} = 4 \quad R_f = [4, +\infty)$

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(ج)
 $y_{\max} = 9 \quad R_f = [0, 9]$

(ب)
 $y_{\max} = 12 \quad R_f = (-\infty, 12]$

(ب)
 $R_f = R$

(الف)
 $R_f = R$

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(ج)
 $R_f = [0, +\infty)$

(ج)
 $R_f = [0, +\infty)$

(ب)
 $R_f = R - \{1\}$

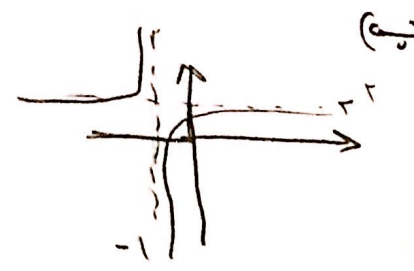
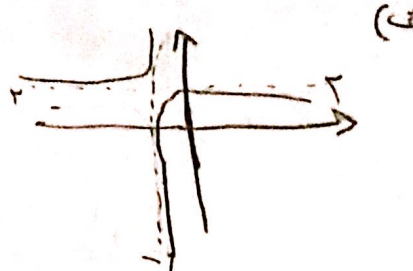
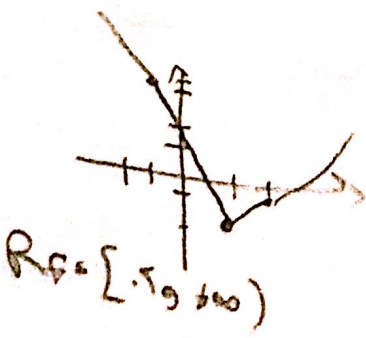
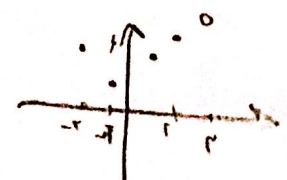
(الف)
 $R_f = R - \{1\}$

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(ب)
 $R_f = [0, +\infty)$

(الف)
 $R_f = [0, +\infty) - \{\sqrt{2}\}$

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(ب) 	(الف) 	٦
(ب) $x^2 + \frac{1}{x^2} = y$ $R_f = [1, +\infty) \cup (-\infty, -1]$ $R_f = [1, +\infty) \cup \frac{1}{\sqrt{x}}$	(الف) $\sin x + \frac{1}{\sin x} = y$ $R_y = [2, +\infty) \cup (-\infty, -2]$ (ب) $\sqrt{x} + \frac{1}{\sqrt{x}}$ $[1, +\infty) \cup (-\infty, -1]$	٧
(ب) $\frac{x^2 + 1}{\sqrt{x^2 + 1}} = \sqrt{x^2 + 1} + \frac{1}{\sqrt{x^2 + 1}} = y$ $\sqrt{x^2 + 1} = y$ $R_f = \left(\frac{1}{\sqrt{2}}, +\infty\right)$	(الف) $y = \left(\frac{1}{x} + c\right) + \left(\frac{1}{\frac{1}{x} + c}\right) - c$ $R_f = \left[\frac{1}{c} + c, +\infty\right)$	٨
(ب) $y = x - c + c - x + 1 \Rightarrow \begin{cases} x + 1 & x > c \\ x + 1 & \frac{1}{c} \leq x \leq c \\ -x - 1 & x < \frac{1}{c} \end{cases}$		٩
(ب)  $R_f = \left[\frac{1}{2}, +\infty\right)$	(الف)  $R_f = (c, +\infty)$	١٠

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