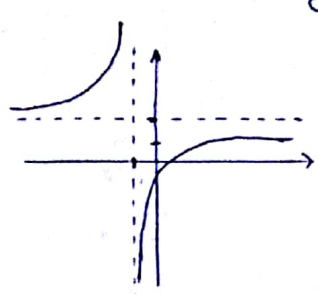
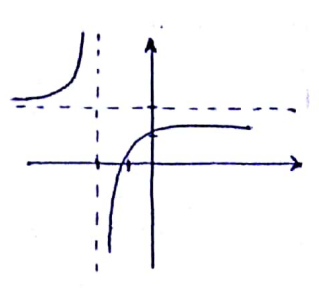
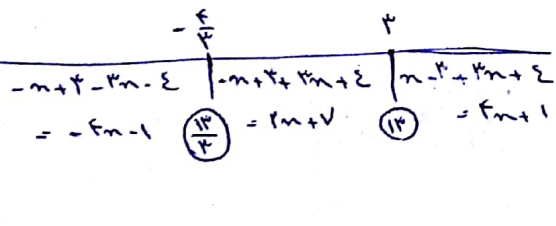
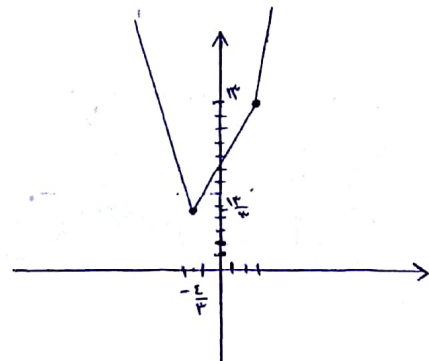
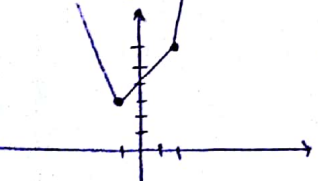
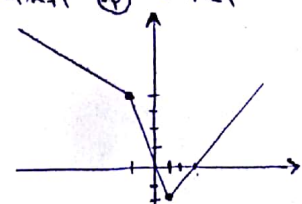


الف) $y = x^3 - 3x^2 + 3x - 1 + 1 = (x-1)^3 + 1 \rightarrow y-1 = (x-1)^3 \Rightarrow x-1 = \sqrt[3]{y-1} \Rightarrow x = \sqrt[3]{y-1} + 1$ $\Rightarrow R_f = \mathbb{R}$ ب) $y = \frac{1}{x^2 - 2x} \rightarrow yx^2 - 2xy = 1 \rightarrow yx^2 - 2xy - 1 = 0 \quad \Delta = 4y^2 + 4y \quad x = \frac{2y \pm \sqrt{4y^2 + 4y}}{2y}$ $\rightarrow y(y+1) > 0 \Rightarrow y(y+1) > 0 \quad \frac{-1}{+ \quad - \quad +} \rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$	۱	
الف) $y = x^2 - 4x + 4 \xrightarrow{a.f.} \begin{cases} x_{min} = \frac{-b}{2a} = 2 \\ y_{min} = 4 \end{cases}$ $R_f = [4, +\infty)$	ب) $y = -x^2 + 4x + 3 \xrightarrow{a.f.} \begin{cases} x_{max} = \frac{-b}{2a} = 2 \\ y_{max} = 11 \end{cases}$ $R_f = (-\infty, 11]$	۲
الف) $y = \sqrt{x^2 - 4x + 4} + 1 \xrightarrow{a.f.} \begin{cases} x_{min} = \frac{-b}{2a} = 2 \\ y_{min} = 1 \end{cases}$ $R_f = [1, +\infty)$	ب) $y = \sqrt{-x^2 + 4x} \xrightarrow{a.f.} \begin{cases} x_{max} = \frac{-b}{2a} = 2 \\ y_{max} = 2 \end{cases}$ $R_f = [0, 2]$	۳
الف) $y = x^3 - 3x^2 + 3x + 1 \rightarrow R_f = \mathbb{R}$ ب) $y = x^3 - 4x^2 + 4x + 2 \rightarrow R_f = \mathbb{R}$ ج) $y = \sqrt{x^2 - 4x + 4} + 1 \rightarrow R_f = \sqrt{\mathbb{R}} = [0, +\infty)$ د) $y = (x^2 - 4x + 4)^2 + 1 \rightarrow R_f = (\mathbb{R})^2 = [0, +\infty)$		۴
الف) $y = \frac{x+1}{x-2} \rightarrow a=1, b=1, c=1, d=-2 \quad R_f = \mathbb{R} - \left\{\frac{a}{c}\right\} \rightarrow R_f = \mathbb{R} - \{1\}$ ب) $y = \frac{x+1}{x+1} \rightarrow a=1, b=1, c=1, d=1 \quad R_f = \mathbb{R} - \left\{\frac{a}{c}\right\} \rightarrow R_f = \mathbb{R} - \{1\}$		۵
الف) $y = \sqrt{\frac{x+1}{x+1}} \rightarrow \sqrt{\mathbb{R} - \{1\}} \Rightarrow R_f = [0, +\infty) - \{1\}$ ب) $y = \sqrt{\frac{x+1}{-x+1}} \rightarrow \sqrt{\mathbb{R} - \{1\}} \Rightarrow R_f = [0, +\infty)$	$R_f = \mathbb{R} - \left\{\frac{a}{c}\right\} \leftarrow$ $\frac{1}{\text{مخرج صفر باشد}}$	۶

ا) $y = \frac{x-1}{x+1}$ جانب $\frac{0}{\infty} = 1$ جانب $\frac{\infty}{\infty} = 1$ 	ب) $y = \frac{x-1}{x+1}$ جانب $\frac{0}{\infty} = 1$ جانب $\frac{\infty}{\infty} = 1$ 	6
ا) $y = \sin x + \frac{1}{\sin x} \rightarrow R_f = (-\infty, -1] \cup [1, +\infty)$ ب) $y = \frac{x^4+1}{x^2} = x^2 + \frac{1}{x^2} \rightarrow R_f = (-\infty, -1] \cup [1, +\infty)$ ج) $y = \frac{\sqrt{x^2+1}}{\sqrt{x}} = \sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow R_f = (-\infty, -1] \cup [1, +\infty)$ د) $y = \sqrt{x} + \frac{1}{\sqrt{x}} \rightarrow R_f = [1, +\infty)$		7
ا) $y = x^2 + \frac{1}{x^2+1} \xrightarrow{x \rightarrow \infty} x^2 + 1 - 1 \rightarrow x^2 + 1 + \frac{1}{x^2+1} - 1 \rightarrow R_f = [\frac{1}{2}, +\infty)$ $x \rightarrow \infty \rightarrow x + \frac{1}{x} = \frac{1}{x}$ ب) $y = \frac{x^2+1}{\sqrt{x^2+2}} = \sqrt{x^2+2} + \frac{1}{\sqrt{x^2+2}} \rightarrow R_f = [\frac{1}{2}, +\infty)$ $x \rightarrow \infty \rightarrow x + \frac{1}{x} = \frac{1}{x}$		8
$y = x-1 + x+2$ $x=1$ $x=-2$ $-x+1-x-2 = -x-1$ $-x+1+x+2 = x+3$ $x-1+x+2 = x+1$ $\frac{10}{4} = 2.5$ $\frac{11}{4} = 2.75$ 		9
ا) $y = x-1 + x+2$ $-x+1-x-2 = -x-1$ $-x+1+x+2 = x+3$ $x-1+x+2 = x+1$ $\frac{10}{4} = 2.5$ $\frac{11}{4} = 2.75$  $R_f = [2.5, +\infty)$	ب) $y = x-1 - x+1$ $-x+1-x-1 = -x-2$ $-x+1+x+1 = x+2$ $x-1+x+1 = x$ $\frac{10}{4} = 2.5$ $\frac{11}{4} = 2.75$  $R_f = [-2, +\infty)$	10