

$$\text{الف) } x^r = y + 0$$

$$x = \pm \sqrt{y+0}$$

$$\Rightarrow R_f = [-0, \infty) \checkmark$$

$$\text{ب) } x^r = y - 1$$

$$x = \sqrt[3]{y-1}$$

$$\Rightarrow R_f = \mathbb{R} \checkmark$$

$$\text{الف) } y = x^r - \varepsilon x + 4 \Rightarrow y = (x-2)^r + 2 \Rightarrow (x-2)^r = y-2 \Rightarrow x = \sqrt[3]{y-2} + 2 \Rightarrow R_f = [2, \infty) \checkmark$$

$$\text{ب) } y = x^r - \delta x + 1 \Rightarrow y = (x - \frac{\delta}{r})^r - \frac{\delta}{r} + 1 \Rightarrow y = (x - \frac{\delta}{r})^r - \frac{\delta}{r} + 1 \Rightarrow (x - \frac{\delta}{r})^r = y + \frac{\delta}{r}$$

$$\Rightarrow x = \sqrt[3]{y + \frac{\delta}{r}} + \frac{\delta}{r} \Rightarrow R_f = [-\frac{\delta}{r}, \infty) \checkmark$$

$$\text{الف) } y = \frac{x^r + r}{x^r - r} \Rightarrow x^r + r = y(x^r - r) \Rightarrow x^r - yx^r = -r - ry \Rightarrow x^r(1-y) = -r - ry \Rightarrow x^r = \frac{-r - ry}{1-y}$$

$$\Rightarrow x = \pm \sqrt[3]{\frac{-r - ry}{1-y}} \quad \begin{array}{c} -\frac{r}{1-y} \\ + \frac{r}{1-y} \end{array} \quad R_f = (-\infty, -\frac{r}{1-y}] \cup (1, +\infty) \checkmark$$

$$\text{ب) } y = \frac{r|x| + 1}{|x| - \varepsilon} \Rightarrow r|x| - y|x| = -1 - \varepsilon y \Rightarrow |x|(r-y) = -1 - \varepsilon y \Rightarrow |x| = \frac{-1 - \varepsilon y}{r-y}$$

$$\Rightarrow R_f = (-\infty, -\frac{1}{\varepsilon}] \cup (1, \infty) \checkmark$$

$$y = \frac{1}{x^r - \varepsilon x} \Rightarrow y(x^r - \varepsilon x) = 1 \Rightarrow x^r y - \varepsilon xy - 1 = 0 \Rightarrow x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \checkmark$$

$$x = \frac{\varepsilon \pm \sqrt{14 + \varepsilon y}}{\varepsilon y}$$

$$\Rightarrow \Delta \geq 0 \Rightarrow 14 + \varepsilon y \geq 0 \Rightarrow \varepsilon(y+4) \geq 0 \Rightarrow R_f = (-\infty, -\frac{1}{\varepsilon}] \cup (0, +\infty)$$

$$x = \frac{fy \pm \sqrt{14y^2 + \varepsilon y}}{fy} \xrightarrow[y \neq 0]{\Delta \geq 0} \begin{array}{c} 14y^2 + \varepsilon y \geq 0 \\ fy(fy+1) \geq 0 \end{array} \quad \begin{array}{c} -\frac{1}{f} \quad 0 \\ + \quad | \quad - \quad + \end{array}$$

$$\text{الف) } y = x^r - 4x + 2$$

$$M_{in} / x = \frac{-b}{ra} = 2$$

$$y = 9 - 16 + 2 = -5$$

$$\Rightarrow M_{in} / -5$$

$$\Rightarrow R_f = [-5, \infty) \checkmark$$

$$\text{ب) } -x^r + \varepsilon x + 2$$

$$M_{ax} / x = \frac{-b}{ra} = 2$$

$$-x^r + \varepsilon x + 2 = 4$$

$$M_{ax} = \frac{r}{4}$$

$$\Rightarrow R_f = (-\infty, 4] \checkmark$$

$$\text{الف) } y = \sqrt{x^2 - 4x + 4}$$

$$\text{Min} \left| x = \frac{-b}{2a} = 2 \right|$$

$$y = -4$$

$$\Rightarrow R_f = [0, \infty) \quad \checkmark$$

$$\text{ب) } y = \sqrt{-x^2 + 4x + 1}$$

$$\text{Max} \left| x = \frac{-b}{2a} = 2 \right|$$

$$y = 14$$

$$\Rightarrow R_f = [0, 14] \quad \checkmark$$

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$$\text{الف) } y = \sqrt{x^2 + 3x + 2}$$

$$\Rightarrow R_f = \mathbb{R} \quad \checkmark$$

$$\text{ب) } y = \sqrt{x^2 + 4x + 4}$$

$$R_f = \sqrt{14} \Rightarrow R_f = [0, \infty)$$

$$(2) \quad \checkmark$$

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$$\text{الف) } y = \frac{3x+1}{x-2}$$

$$R_f = \mathbb{R} - \{3\} \quad \checkmark$$

$$\text{ب) } y = \sqrt{\frac{4x+1}{2x+3}}$$

$$R_f = \sqrt{14} - \{4\}$$

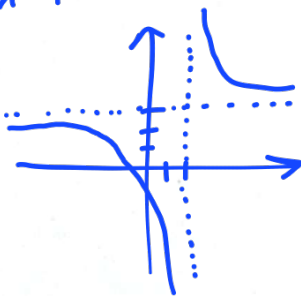
$$\Rightarrow R_f = [0, \infty) - \{1\} \quad \checkmark$$

$$(2)$$

1

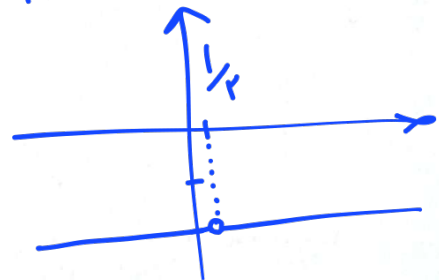
$$\text{الف) } y = \frac{3x+1}{x-2}$$

محاسب افقی = 3
محاسب عمودی = 2



$$\text{ب) } y = \frac{4x-2}{1-2x} = -2$$

$$x \neq \frac{1}{2}$$



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$$\text{الف) } y = \cos^2 x + \frac{1}{\cos^2 x}$$

$$R_f = [2, \infty) \quad \checkmark$$

$$(1/10)$$

$$\text{ب) } y = \sqrt{\frac{x^2+1}{x}}$$

$$= \sqrt{x + \frac{1}{x}}$$

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

$$R_f = (-\infty, \sqrt{2}] \cup [\sqrt{2}, +\infty)$$

1.