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$$y = x^r - \Delta \rightarrow x^r = y + \Delta \rightarrow x = \pm \sqrt[r]{y + \Delta}$$

$$\begin{matrix} y + \Delta > 0 \\ y > 0 \end{matrix} \rightarrow R_f = [-\Delta, +\infty) \checkmark$$

$$y = x^r + 1 \rightarrow x^r = y - 1$$

$$\rightarrow x = \sqrt[r]{y-1} \Rightarrow R_f = [1, +\infty) \checkmark$$

$$y = x^r - rx + r$$

$$\rightarrow t+r \quad y = x^r - rx + r + 1 - r \rightarrow (x-r)^r + r = y$$

$$(x-r)^r = y-r \rightarrow x-r = \pm \sqrt[r]{y-r}$$

$$x = \pm \sqrt[r]{y-r} + r \quad R_f = [r, +\infty) \checkmark$$

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$$y = x^r - \Delta x + 1$$

$$\left(\frac{-\Delta}{r}\right)^r = \frac{r\Delta}{r} \quad \Delta x + \frac{r\Delta}{r} + 1 - \frac{r\Delta}{r} = 0 \quad ۵، ۱۵$$

$$\rightarrow \frac{r\Delta}{r}$$

$$\frac{x^r + r}{x^r - r}$$

$$y x^r - r y = x^r + r \rightarrow y x^r - x^r = r + r y \rightarrow x^r (y-1) = r(1+y) \rightarrow x^r = \frac{r(1+y)}{y-1} \rightarrow x = \pm \sqrt[r]{\frac{r(1+y)}{y-1}}$$

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$$x^r = \frac{r(1+y)}{y-1} \rightarrow x = \pm \sqrt[r]{\frac{r(1+y)}{y-1}}$$

$$\begin{matrix} y > 0 \\ y > 1 \end{matrix} \quad R_f = (1, +\infty) \quad \text{X}$$

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

$$|x| = \frac{1 + r y}{y-r} \rightarrow \frac{-\frac{1}{r}}{+\frac{1}{r} - \frac{1}{y} + \frac{r}{y}}$$

$$R_f = (-\infty, -\frac{1}{r}] \cup (r, +\infty)$$

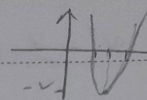
$$y = \frac{1}{x^r - rx} \rightarrow y x^r - r x y = 1 \rightarrow y x^r - r x y - 1 = 0 \quad \Delta = (ry)^2 - 4(-1)(y) = 14y^r + ry > 0 \quad -r$$

$$R_f = (-\infty, -\frac{1}{r}] \cup (r, +\infty)$$

$$ry(r y + 1) > 0 \quad y > 0 \quad r > 0$$

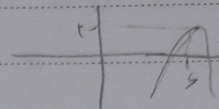
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$$y = x^2 - 4x + 2 \rightarrow \min \left| \begin{array}{l} -\frac{b}{2a} = \frac{4}{2} = 2 \\ y = -\frac{\Delta}{4a} = -1 \end{array} \right. \rightarrow R_f = [-1, +\infty)$$



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$$y = -x^2 + 5x + 2 \rightarrow \max \left| \begin{array}{l} -\frac{b}{2a} = \frac{5}{-2} = -2.5 \\ y = 4 \end{array} \right. \rightarrow (-\infty, 4]$$



$$y = \sqrt{x^2 - 8x + 2} \rightarrow \min \left| \begin{array}{l} \frac{y}{x} = 2 \\ -1 \end{array} \right. \rightarrow R_f = \sqrt{[-1, +\infty)} \rightarrow R_f = [0, +\infty)$$

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$$y = \sqrt{-x^2 + 4x + 10} \rightarrow \max \left| \begin{array}{l} 2 \\ 15 \end{array} \right. R_f = \sqrt{[-15, 15]} \rightarrow R_f = [0, \sqrt{15}]$$

$$y = x^2 + 3x^2 + 2x + 1 \rightarrow R_f = (R)$$

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$$y = \sqrt{x^2 + 6x + 10} \rightarrow R_f = \sqrt{(R)} \rightarrow R_f = [0, +\infty)$$

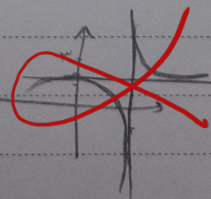
$$y = \frac{3x+1}{x-2} \quad R_f = R - \left\{ \frac{3}{2} \right\} \rightarrow R_f = (R - \{3\})$$

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$$y = \sqrt{\frac{x+1}{x+2}} \rightarrow R_f = (R - \left\{ \frac{3}{2} \right\}) \rightarrow R_f = [0, +\infty) - \{3\}$$

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

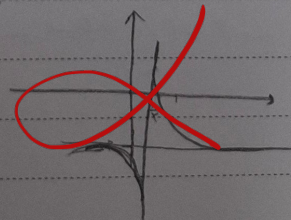
$$y' = x - 2 + 0 \rightarrow x \neq 2 \quad \left. \begin{array}{l} 010 \\ 0100 \end{array} \right\} =$$



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$$y = \frac{6x-2}{1-2x}$$

$$y' = 1 - 2x = 0 \rightarrow 1 - 2x = 0 \rightarrow x = \frac{1}{2}$$



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Year: _____ Month: _____ Date: _____ ()

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$$y = \cos x + \frac{1}{\cos x} \in \mathbb{R} [0, +\infty)$$

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

$$x > 0 \rightarrow [\sqrt{x}, +\infty)$$

$$x < 0 \rightarrow (-\infty, -\sqrt{-x}]$$