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٢٥ حيلة خوب نوشتن:

الف) $\frac{|x|+1}{|x|-2}$ $\max |x| = +\infty \rightarrow y = 1$ $\min |x| = 0 \rightarrow y = -\frac{1}{2} \rightarrow Rf = (-\infty, -\frac{1}{2}] \cup (1, +\infty)$ (2)

ب) $y = \frac{x^2+1}{|x|} = |x| + \frac{1}{|x|} \rightarrow a + \frac{1}{a} \geq r \rightarrow |x| + \frac{1}{|x|} \geq r \rightarrow Rf = [r, +\infty)$

$y = \frac{x^2+2x-2}{x+2} \rightarrow x^2 + (r-y)x - r - 2y = 0 \rightarrow x = \frac{y-r \pm \sqrt{y^2 - 4y + 4 + 4r + 8}}{2}$ (2)

$\rightarrow y^2 - 4y + 4 + 4r + 8 \geq 0 \rightarrow (y+2)(y+4) \geq 0 \rightarrow Rf = (-\infty, -2] \cup [4, +\infty)$

10. $f(x) = \frac{x^2-x+\frac{1}{2}}{x^2-x+1} = 1 - \frac{r}{r(x^2-x+1)}$ (2)

$x^2-x+1 \neq 0$ $\Delta = -3 < 0$ $x = \frac{1}{r}$ $Rf = [0, 1)$ $Df = \mathbb{R}$

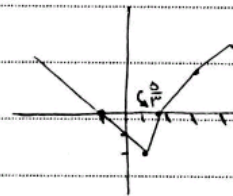
15. $y = \sqrt{-x^2+4x-1}$ $-x^2+4x-1 \geq 0 \rightarrow (-\infty, 3] \rightarrow [0, \sqrt{3}]$ (2)

ب) $y = \sqrt[3]{x^2-4x}$ $x^2-4x \geq 0 \rightarrow [-1, +\infty) \rightarrow Rf = [-2, +\infty)$

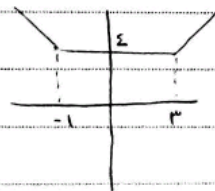
20. الف) $\log(x^2-x+1)$ $x^2-x+1 \rightarrow \log(-\infty, +\infty) \rightarrow \log(0, +\infty) \rightarrow Rf = \mathbb{R}$ (2)

ب) $\log_r(\frac{x^2+1}{x}) \rightarrow \log_r(x + \frac{1}{x})$ $x > 0 \rightarrow \log_r [1, +\infty) \rightarrow Rf = [1, +\infty)$ $x < 0 \rightarrow \log_r (-\infty, -1] \rightarrow$

25. الف) $y = |x-1| - |x-2| \rightarrow Rf = [-1, +\infty)$ (2)



ب) $y = |x-1| + |x+1| \rightarrow Rf = [2, +\infty)$



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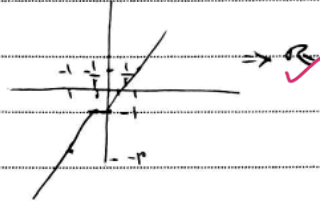
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$$|x-r| - |rx+r| \leq 1 \rightarrow -x+r+rx+r \leq 1 \rightarrow x \leq -r$$

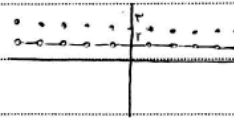
$$\rightarrow -x+r-rx-1 \leq 1 \rightarrow -1 \leq rx \rightarrow \frac{-1}{r} \leq x$$

$$x \in (-\infty, -r] \cup [-\frac{1}{r}, +\infty) \checkmark$$

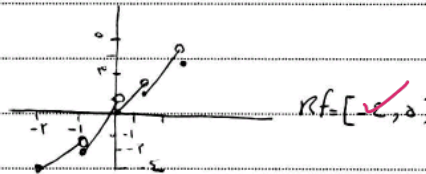
5. $y = 3x - |rx+1| + |x|$



10. الف) $y = [x] + [r-x] = [x] + [-x] + r$



ب) $3x - [x]$



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$$\sin^2 x - \sin x + 1 \begin{cases} \text{max} & 1 \rightarrow y = 2 \\ \text{min} & 0 \rightarrow y = 1 \end{cases} \quad [\frac{r}{2}, r] \checkmark$$

20. $y = \sin^2 x + \sin x + 1 \begin{cases} \text{max} & 1 \rightarrow y = 2 \\ \text{min} & 0 \rightarrow y = 1 \\ & -\frac{1}{r} x \end{cases} \quad [1, r] \checkmark$

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