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دوازدهم تجربی A — تکلیف ۳ — پردیس ایرانمهر

۱ـ

$y = \dfrac{x^2+x+2}{x-1} \Rightarrow xy - y = x^2+x+2 \Rightarrow x^3 + x + 2 - xy + y = 0$

$x^2 + x(1-y) + 2 + y = 0 \qquad \Delta \geq 0 \Rightarrow (1-y)^2 - 4(2+y) \geq 0$

$1 + y^2 - 2y - 4y - 8 \geq 0 \Rightarrow y^2 - 6y - 7 \geq 0 \rightarrow$

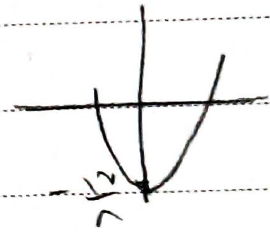
	-1		7	
$+$	ϕ	$-$	ϕ	$+$

$\boxed{R_f = (-\infty, -1] \cup [7, +\infty)}$

۲ـ

الف) $y = 3x^2 - 5x + 1$

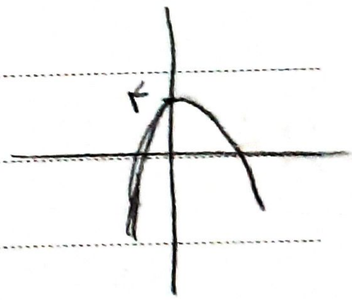
$S \left| \begin{array}{l} \dfrac{-b}{2a} = \dfrac{5}{6} \\ -\dfrac{17}{8} \end{array} \right.$



$\boxed{R_f = [-\tfrac{17}{8}, +\infty)}$

ب) $y = \sqrt{-x^2+4x-5}$

$S \left| \begin{array}{l} \dfrac{-b}{2a} = \dfrac{-4}{-2} = 2 \\ 4 \end{array} \right.$



$\boxed{R_f = \sqrt{(-\infty, 4]} = [0, 2]}$

ج) $y = \sqrt{x^7 - 3x^2 + 4x + 1}$ $\qquad \boxed{R_f = \sqrt{R} = [0, +\infty)}$

د) $y = \log^{x^3 - 4x^2 + 7x + 4}$ $\qquad \boxed{R_f = R}$

$x^3 - 4x^2 + 7x + 4 \in \mathbb{R} \rightarrow \log^{(0, +\infty)} = \mathbb{R}$

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الف) $y=\frac{3x+1}{2x-4} \Rightarrow x=-\frac{-4y-1}{2y-3}=\frac{1+4y}{2y-3}$

$\Rightarrow 2y-3\neq 0 \Rightarrow 2y\neq 3 \Rightarrow y\neq \frac{3}{2}$ $\boxed{R_f=\mathbb{R}-\{\frac{3}{2}\}}$

ب) $y=\sqrt{\frac{4x+1}{x-2}}$ $x=-\frac{-2-1}{y-4}=\frac{1+2}{y-4} \Rightarrow y-4\neq 0 \Rightarrow y\neq 4$

$\boxed{R_f=\sqrt{\mathbb{R}-\{4\}}=[0,2]}$

ج) $y=\frac{x^2+4}{\sqrt{x^2+3}}=\frac{x^2+3+1}{\sqrt{x^2+3}}=\sqrt{x^2+3}+\frac{1}{\sqrt{x^2+3}} \Rightarrow \sqrt{x^2+3}>0$ همیشه

$\boxed{\Rightarrow R_f=[2,+\infty)}$

د) $y=x^2+\frac{1}{x^2+4}$

کمترین مقدار $x^2=0 \Rightarrow y=\frac{1}{4}$ $\boxed{R_f=[\frac{1}{4},+\infty)}$

۴-

$y=\frac{3x^2+4}{x^2-1}$ اصلی ، $yx^2-y=3x^2+4$

$\Rightarrow yx^2-3x^2=4+y \Rightarrow x^2(y-3)=4+y \Rightarrow x^2=\frac{4+y}{y-3}$

$\Rightarrow x=\pm\sqrt{\frac{4+y}{y-3}} \Rightarrow \frac{4+y}{y-3}\geq 0$ $\boxed{R_f=(-\infty,-4]\cup(3,+\infty)}$

$y\neq 3$

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روش ۲ ؛ $x^2=0 \rightarrow \frac{3(0)+4}{0-1} = -4$

$-4 \qquad 3$

$x^2=+\infty \rightarrow \frac{3(+\infty)+4}{+\infty-1} = 3$

چون مخرج نمی‌تواند ۰ شود.

$$\boxed{R_f=(-\infty,-4] \cup (3,+\infty)}$$

۵_ $y = \frac{2\sin x-1}{\sin x+3}$

روش ۱ : $y\sin x + 3y = 2\sin x - 1$

$\rightarrow (2-y)\sin x = 3y+1 \rightarrow \sin x = \frac{3y+1}{2-y}$

$\rightarrow -1 \underset{\text{II}}{\leq} \frac{3y+1}{2-y} \underset{\text{I}}{\leq} 1$

$y \in [-\frac{3}{2}, 2)\ \text{II} \qquad y \in (-\infty, \frac{1}{4}] \cup (2, +\infty)\ \text{I}$

$$\boxed{R_f = \text{I} \cap \text{II} = [-\frac{3}{2}, \frac{1}{4}]}$$

روش ۲ : $\sin x = -1 \rightarrow \frac{2(-1)-1}{-1+3} = \frac{-3}{2}$

$-\frac{3}{2} \qquad \frac{1}{4}$

$\sin x = 1 \rightarrow \frac{2(1)-1}{1+3} = \frac{1}{4}$

مخرج نمی‌تواند ۰ باشد

$$\boxed{R_f = [-\frac{3}{2}, \frac{1}{4}]}$$

۶_ $y = \frac{x^2-x+\frac{1}{4}}{x^2-x+1} = \frac{(x-\frac{1}{2})^2}{(x-\frac{1}{2})^2+\frac{3}{4}} \rightarrow (x-\frac{1}{2})^2 = t$

$\rightarrow y = \frac{t}{t+\frac{3}{4}} \xrightarrow{x=\frac{1}{2}} y=0$

$\xrightarrow{x=+\infty} y=1$

$\rightarrow \boxed{R_f = [0,1)}$

چون که جمله از ۱ کمتر است هیچ وقت ۱ نمی‌شود

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$x^2 - x + 1 = 0 \Rightarrow x = \dfrac{1 \pm \sqrt{1 - 4(1)(1)}}{2} \Rightarrow \Delta < 0$

پس هیچگاه این کسر صفر نمی شود ←

$\boxed{D_f = \mathbb{R}}$

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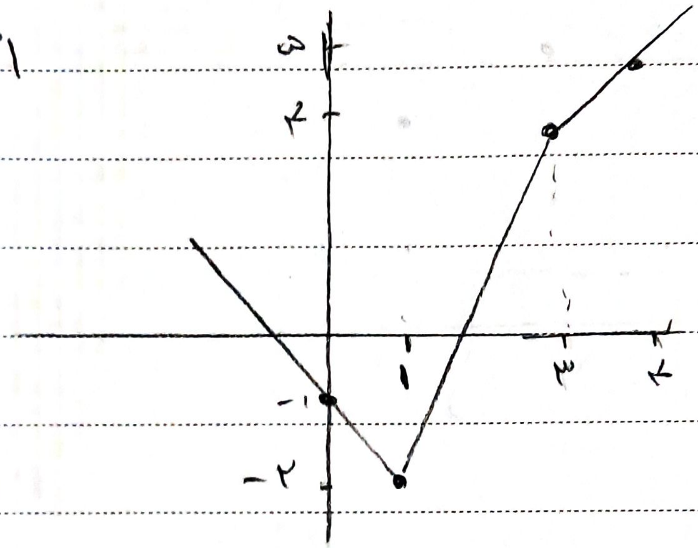
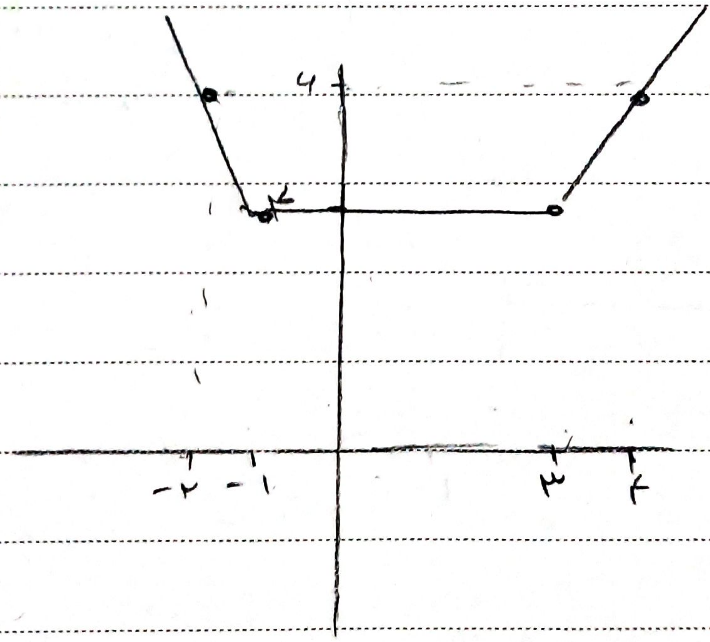
الف) $y = |\underbrace{2x-2}_{\downarrow\ 1}| - |\underbrace{x-3}_{\downarrow\ 3}|$

$\boxed{R_f = [-2, +\infty)}$



ب) $y = |\underbrace{x-3}_{\downarrow\ 3}| + |\underbrace{x+1}_{\downarrow\ -1}|$

$\boxed{R_f = [4, +\infty)}$



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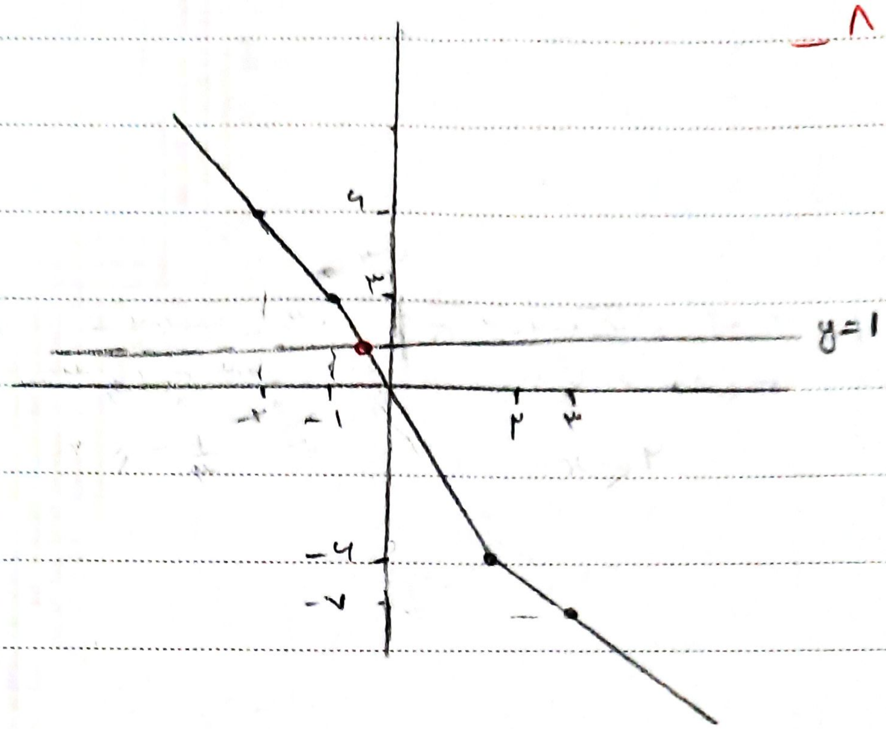
$$|x-2|-|2x+2| \leq 1$$

$x-2 \to 2$ ، $2x+2 \to -1$

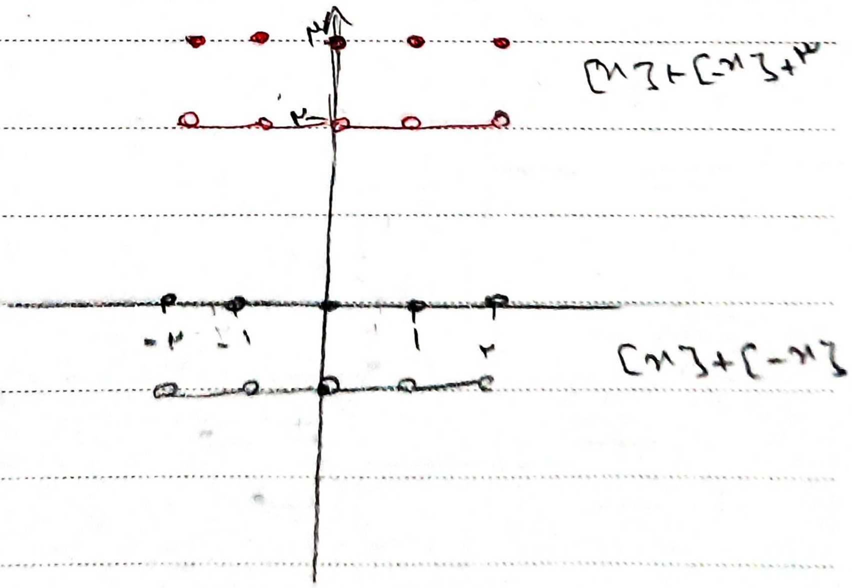


$-1 \leq x \leq 2 \rightarrow 2-x-2x-2=-3x \qquad -3x=1 \rightarrow x=-\frac{1}{3}$

$|x-2|-|2x+2| \leq 1 \rightarrow \boxed{x \geq -\frac{1}{3}}$

۹ـ الف) $y=[x]+[3-x]=[x]+([-x]+3)=[x]+[-x]+3$

$\boxed{R_f=\{2,3\}}$



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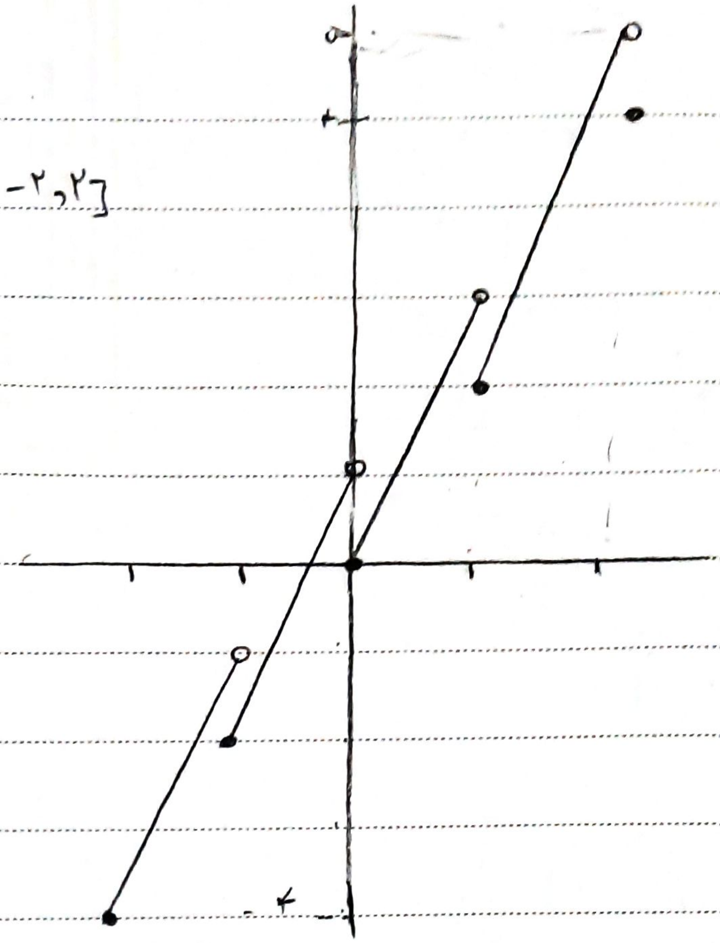
ب) $y = 3x - [x]$ $\quad [-2, 2]$



$-2 \le x < -1 \Rightarrow y = 3x + 2$

$-1 \le x < 0 \Rightarrow y = 3x + 1$

$0 \le x < 1 \Rightarrow y = 3x$

$1 \le x < 2 \Rightarrow y = 3x - 1$

$x = 2 \Rightarrow y = 3x - 2 = 4$

$\boxed{R_f = [-4, 5)}$

۱۰- الف) $y = \sin^2 x - \sin x + 1$

$\xrightarrow{1} 1 + 1 + 1 = 3$

$\xrightarrow{\uparrow} 1 - 1 + 1 = 1$

$-\frac{\Delta}{4a} \downarrow \quad \frac{1}{2}$

$\boxed{R_f = [\frac{1}{2}, 3]}$

ب) $y = \sin^4 x + \sin^2 x + 1$

$\xrightarrow{0} 0 + 0 + 1 = 1$

$\xrightarrow{\uparrow} 1 + 1 + 1 = 3$

$-\frac{\Delta}{4a} \downarrow \quad -\frac{1}{2}$ عبارت منفی نمی‌تواند باشد.

$\boxed{R_f = [1, 3]}$