۲۵ آفرین

Subject — مهسا نامزاغتی - گروه پنجشنبه - دهم دختر ۲

Year . Mont . Day . ( ) — تکلیف شماره ۹

۱) ۳

الف) $y = x^2 - 5 \to x^2 = y + 5 \to x = \pm\sqrt{y+5}$

$y + 5 \geq 0 \to y \geq -5 \to \boxed{R_f = [-5, +\infty)}$

ب) $y = x^3 + 1 \quad \boxed{R_f = \mathbb{R}}$

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۲) ۲

الف) $y = x^2 - 4x + 6 \to y = x^2 - 4x + 4 + 2$

$y = (x-2)^2 + 2 \to y - 2 = (x-2)^2 \to x - 2 = \pm\sqrt{y-2}$

$x = \pm\sqrt{y-2} + 2 \to y - 2 \geq 0 \to y \geq 2$

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

ب) $y = x^2 - 5x + 1 \to x^2 - 5x + 1 - y = 0 \to x = \dfrac{-b \pm \sqrt{\Delta}}{2a}$

$\Delta = b^2 - 4ac = (-5)^2 - 4 \times 1 \times (1-y) = 25 - 4(1-y)$

$x = \dfrac{5 \pm \sqrt{25 - 4(1-y)}}{2} \to 25 - 4(1-y) \geq 0 \to 25 - 4 + 4y \geq 0 \to 21 + 4y \geq 0$

$4y \geq -21 \to y \geq \dfrac{-21}{4} \to y \geq -5{,}25$

$R_f = [-5{,}25, +\infty) = \boxed{[-\frac{21}{4}, +\infty)}$

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۳) ۴

الف) $y = \dfrac{x^2 + 3}{x^2 - 2} \to x^2 + 3 = yx^2 - 2y \to x^2 - yx^2 = -2y - 3 \to x^2(1-y) = -2y - 3$

$x^2 = \dfrac{-2y-3}{1-y} \to x = \pm\sqrt{\dfrac{-2y-3}{1-y}} \to \dfrac{-2y-3}{1-y} \geq 0 \to -2y-3 \to -\frac{3}{2}$, $1-y \to 1$

$-\frac{3}{2}$ $\quad$ 1

$+ \quad 0 \quad - \quad$ تن $\quad +$

$\to \boxed{R_f = (-\infty, -\frac{3}{2}] \cup (1, +\infty)}$

ب) $\dfrac{2|x| + 1}{|x| - 4} \to 2|x| + 1 = y|x| - 4y \to 2|x| - y|x| = -4y - 1$

$|x|(2-y) = -4y - 1 \to |x| = \dfrac{-4y-1}{2-y} \to \dfrac{-4y-1}{2-y} \geq 0$; $-4y-1 \to -\frac{1}{4}$, $2-y \to 2$

$-\frac{1}{4}$ $\quad$ 2

$+ \quad 0 \quad - \quad$ تن $\quad +$

$\to \boxed{R_f = (-\infty, -\frac{1}{4}] \cup (2, +\infty)}$

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④

$y=\frac{1}{x^2-4x} \rightarrow 1 = yx^2-4xy \rightarrow \overset{a}{y}x^2 \overset{b}{-4x}y \overset{c}{-1}=0$

$\Delta = b^2-4ac = (-4y)^2-4\times y(-1) = 16y^2+4y$

$x=\frac{-b\pm\sqrt{\Delta}}{2a} = \frac{4y\pm\sqrt{16y^2+4y}}{2y} \rightarrow y\neq 0$ $16y^2+4y \geq 0 \rightarrow$

$4y(4y+1)\geq 0$ $\downarrow 0$ $\hookrightarrow -\frac{1}{4}$

$\boxed{R_f = (-\infty, -\frac{1}{4}] \cup [0, +\infty)}$

$+ \quad -\frac{1}{4} \quad - \quad 0 \quad +$

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⑤

الف) $y=x^2-6x+2$ $a>0 \rightarrow min$

$min = \frac{-b}{2a} = \frac{-(-6)}{2\times 1} = \frac{6}{2} = 3$ $y_{min} = 3^2-6\times 3+2 = 9-18+2 = -7$

$\boxed{R_f = [-7, +\infty)}$

ب) $y=-x^2+4x+2$ $a<0 \rightarrow max$

$max = \frac{-b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2$ $y_{max} = -2^2+4\times 2+2 =$
$-4+8+2=6$

$\boxed{R_f = (-\infty, 6]}$

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⑥

الف) $y=\sqrt{x^2-6x+2} \rightarrow y=x^2-6x+2$ $a>0 : min$

$min = \frac{-b}{2a} = \frac{-(-6)}{2\times 1} = \frac{6}{2} = 3$ $y = 3^2-6\times 3+2 = -7 \rightarrow [-\sqrt{7}, +\infty)$

$\boxed{R_f = [0, +\infty)}$

ب) $y=\sqrt{-x^2+4x+10} \rightarrow y=-x^2+4x+10 \rightarrow a<0 : max$

$max = \frac{-b}{2a} = \frac{-4}{2(-1)} = \frac{-4}{-2} = 2 \rightarrow y=-2^2+4\times 2+10 = -4+8+10 = 14$

$(-\infty, +\sqrt{14}]$

$\boxed{R_f = (0, \sqrt{14}]}$

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ب ۷

الف) $y = x^7 + 3x^4 + 2x + 1 \rightarrow \boxed{R_f = \mathbb{R}}$

ب) $y = \sqrt{x^5 + 4x^2 + 4x + 1} \rightarrow \mathbb{R} \rightarrow \boxed{R_f = [0, +\infty)}$

ب ۵

الف) $y = \dfrac{3x+1}{x-2} \rightarrow \boxed{R_f = \mathbb{R} - \{3\}}$

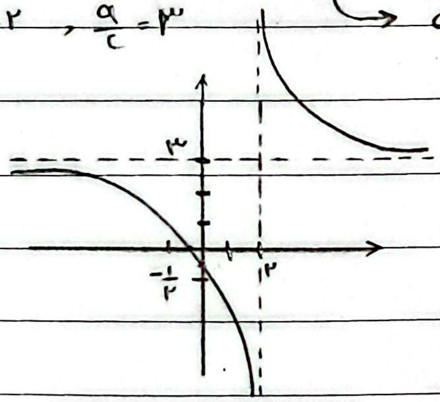
ب) $y = \sqrt{\dfrac{4x+1}{x+3}} \rightarrow \boxed{R_f = \mathbb{R} - \{2\}}$

ب ۹

الف) $y = \dfrac{3x+1}{x-2}$ تابع هموگرافیک $\rightarrow$ مجانب قائم $= 2$

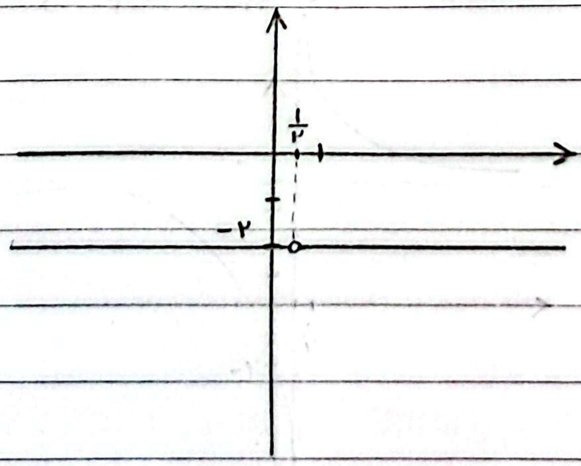
$\rightarrow$ مجانب افقی $= 3$

$x - 2 = 0 \rightarrow x = 2$, $\dfrac{a}{c} = 3$



ب) $\dfrac{4x-2}{1-2x} \rightarrow y = \dfrac{-2(-2x+1)}{1-2x} = \dfrac{-2(1-2x)}{1-2x} = -2$

$y = -2$



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الف) $y = \cos^۲ x + \frac{1}{\cos^۲ x} \rightarrow a + \frac{1}{a} \rightarrow a = \cos^۲$ ۳ ۱۰

$a = \cos^۲ > ۰ \rightarrow \boxed{Rf = [۲, +\infty)}$

ب) $y = \sqrt[۳]{\frac{x^۲+1}{x}} = \sqrt[۳]{\frac{x^۲}{x} + \frac{1}{x}} = \sqrt[۳]{x + \frac{1}{x}}$

$\boxed{Rf = (-\infty, -\sqrt[۳]{۲}] \cup [\sqrt[۳]{۲}, +\infty)}$