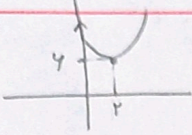
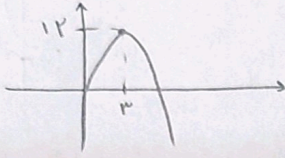
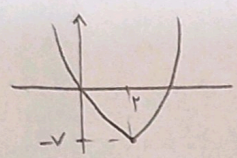


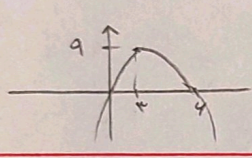
الف) $y = x^3 - 3x^2 + 3x \rightarrow (x-1)^3 + 1 \rightarrow y-1 = (x-1)^3 \rightarrow x = 1 + \sqrt[3]{y-1} \Rightarrow R_f = \mathbb{R}$ (سوال ۱) ۵

ب) $y = \frac{1}{x^2 - 2x} \rightarrow yx^2 - 2xy - 1 = 0 \rightarrow \frac{2y \pm \sqrt{4y^2 + 4y}}{2y} \rightarrow 2 \pm \sqrt{y(y+1)}$
 $y \rightarrow y \neq 0 \Rightarrow R_f = (-\infty, -1] \cup (0, +\infty)$

الف) $y = x^2 - 4x + 10$  $\Rightarrow R_f = [4, +\infty)$ (سوال ۲) ۵

ب) $y = -x^2 + 4x + 3$  $\Rightarrow R_f = (-\infty, 4]$

ج) $y = \sqrt{x^2 - 4x - 3}$  $\Rightarrow R_f = [0, +\infty)$

د) $y = \sqrt{4x - x^2}$  $\Rightarrow R_f = [0, 2]$

الف) $y = x^3 - 6x^2 + 9x + 1$ $\Rightarrow R_f = \mathbb{R}$ (سوال ۳) ۵

ب) $y = x^3 - 4x^2 + 3x + 2$ $\Rightarrow R_f = \mathbb{R}$

ج) $y = \sqrt{x^3 - 4x^2 + 6x + 1}$ $\Rightarrow R_f = [0, +\infty)$

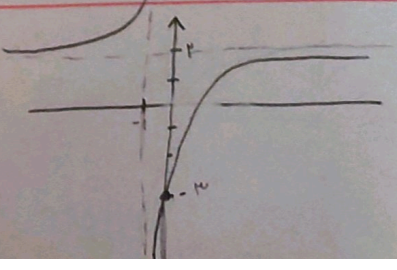
د) $y = (x^3 - 4x^2 + 3x + 1)^2$ $\Rightarrow R_f = [0, +\infty)$

الف) $y = \frac{3x+1}{x-2}$ $\Rightarrow R_f = \mathbb{R} - \{3\}$ (سوال ۴) ۵

ب) $y = \frac{2x+1}{x+1}$ $\Rightarrow R_f = \mathbb{R} - \{2\}$

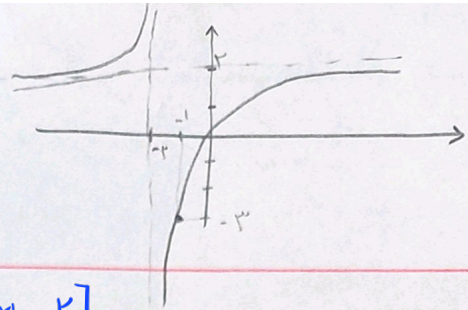
الف) $y = \sqrt{\frac{2x+2}{x+1}}$ $\Rightarrow R_f = [0, +\infty) - \{\sqrt{2}\}$ (سوال ۵) ۵

ب) $y = \sqrt{\frac{3x+1}{2-x}}$ $\Rightarrow \sqrt{\mathbb{R} - \{-3\}} \Rightarrow \sqrt{-3} \Rightarrow R_f = [0, +\infty)$

الف) $y = \frac{2x-3}{x+1}$ $\frac{a}{c} = 2 \rightarrow y$ $\frac{b}{d} = -1 \rightarrow x$  (سوال ۶) ۵
 نقاط: $[-3, 0]$

ب) $y = \frac{x-1}{x+2}$

مماس عمودي = $-2 \rightarrow x$
 مماس افقي = $2 \rightarrow y$
 نقطة: $[-1]$



سوال (7)

1, 1/10

الف) $y = \sin x + \frac{1}{\sin x}$

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

ب) $y = \frac{x^4+1}{x^3} = x^3 + \frac{1}{x^3}$

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

ج) $y = \frac{\sqrt[3]{x^3+1}}{\sqrt[3]{x}} = \sqrt[3]{x} + \frac{1}{\sqrt[3]{x}}$

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

د) $y = \sqrt{x} + \frac{1}{\sqrt{x}}$

$\Rightarrow R_f = [2, +\infty)$

الف) $y = x^2 + \frac{1}{x^3+3}$

$\rightarrow [(x^2+3) + \frac{1}{x^3+3}] - 3 \Rightarrow R_f = [\frac{1}{3}, +\infty)$
 $\min_{x=0}$

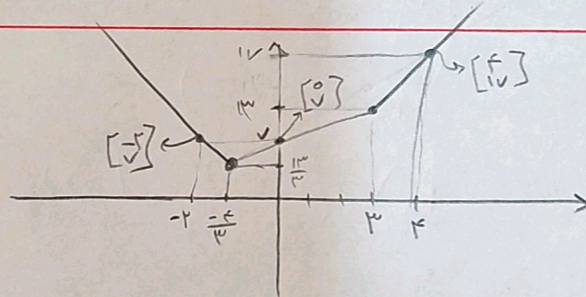
سوال (8)

5

ب) $y = \frac{x^2+a}{\sqrt{x^2+4}} = \sqrt{x^2+4} + \frac{1}{\sqrt{x^2+4}}$

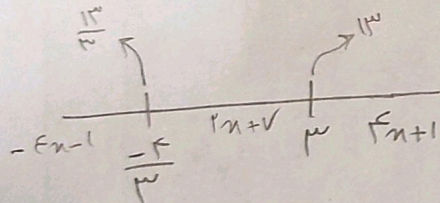
$\Rightarrow R_f = [\frac{a}{2}, +\infty)$
 $\min \rightarrow x=0$

$y = |x-3| + |3x+4|$

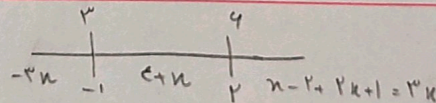


سوال (9)

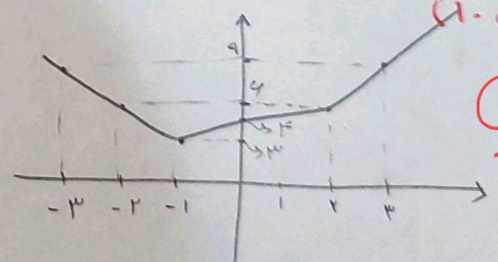
5



الف) $y = |x-2| + |2x+2|$



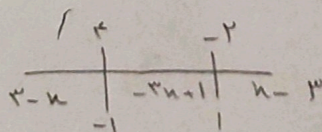
$\Rightarrow R_f = [3, +\infty)$



سوال (10)

5

ب) $y = |2x-2| - |x+1|$



$\Rightarrow R_f = [-2, +\infty)$

