

(سوال ۱)

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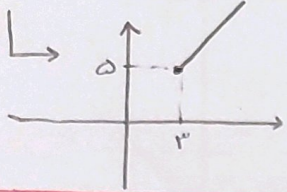
$f(x) = \sqrt{1-x^2}$ و $g = \{(-1, 1), (0, 4), (1, 2)\}$ $2g - 3f = ?$

$f(-1) = 0$
 $f(0) = 1$
 $f(1) = 0$

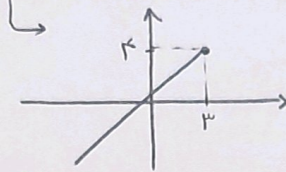
$\Rightarrow \{(-1, 2), (0, 5), (1, 4)\}$

مجموع مقادیر $\rightarrow 2 + 5 + 4 = 11$

$f(x) = 2x - 1 \rightarrow D_f: [3, +\infty)$



$g(x) = \frac{1}{3}x + 3 \rightarrow D_g: (-\infty, 3]$



$\Rightarrow$ اجتماع برد توابع: $(-\infty, 4] \cup [5, +\infty)$

(سوال ۲)

$g = \frac{-x^2}{y} + x + 3$ (a, b)

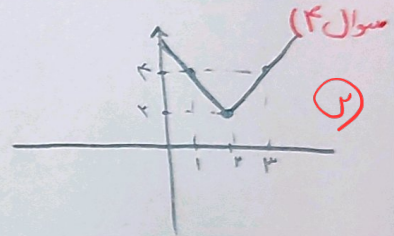
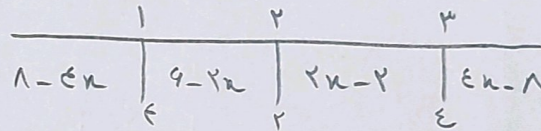
$\frac{-x^2}{y} + x + 3 > \frac{3}{y} \rightarrow x^2 - 2x - 6 < -3 \rightarrow x^2 - 2x - 3 < 0 \rightarrow (x-3)(x+1) < 0$

$\Rightarrow \sqrt{b-a} = \sqrt{3+1} = \sqrt{4} = 2$

$a = -1, b = 3 \Leftrightarrow \frac{-1}{+1} - \frac{3}{-1} = 2$

$g = |x-1| + |x-3| + |2x-4|$
 $x=1 \quad x=3 \quad x=2$

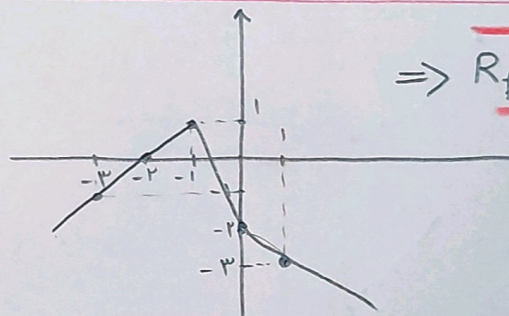
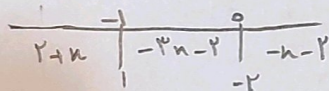
$\min = 2$



(سوال ۴)

(۲)

$g = |x| - 2|x+1|$



$\Rightarrow R_f = (-\infty, 1]$

(سوال ۵)

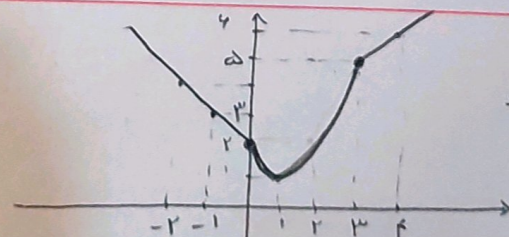
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$g = \frac{x^2 + 2x + m}{x+1} = \frac{(x+1)(x+1) + (m-1)}{x+1} = x+1 + \frac{m-1}{x+1}$

$m \in \mathbb{Z}, m \in \mathbb{N} \rightarrow m = \{1, 2, 3, \dots\} \rightarrow m = ?$

$\rightarrow m < 1 \rightarrow$ No: $m=0 \rightarrow x+1 + \frac{-1}{x+1} \xrightarrow{x+1=a} (a-\frac{1}{a})+1 \rightarrow R_y = \mathbb{R}$
 $\rightarrow m = 1 \rightarrow x+1 \rightarrow R_y = \mathbb{R} - \{1\}$
 $\rightarrow m > 1 \rightarrow$ Yes: $m=2 \rightarrow \frac{1}{x+1} + x+1 \xrightarrow{x+1=a} \frac{1}{a} + a + 1 \rightarrow R_y: (-\infty, 1] \cup [3, +\infty) \neq \mathbb{R}$

$f(x) = \begin{cases} x+2 & , x \geq 3 \\ x^2-2x+2 & , 0 \leq x < 3 \\ |x|+2 & , x < 0 \end{cases}$

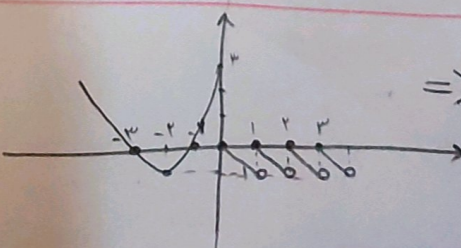


$\Rightarrow R_f = [1, +\infty)$

(سوال ۷)

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$f(x) = \begin{cases} x^2 + 5x + 3 & , x \leq 0 \rightarrow (x+3)(x+1) \\ [2x] - 2x & , x > 0 \end{cases}$



$\Rightarrow R_f = [-1, +\infty)$

(سوال ۸)

(۲)

$x^2 + 5x + 3 = (x+3)(x+1) \rightarrow R_f = [-1, +\infty)$

$[2x] - 2x \rightarrow R_f: (-1, 0]$

سوال ۱۹ $ab=?$

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$$f = a+1 - \sqrt{x+3} \quad D_f = [b, +\infty) \quad R_f = (-\infty, a]$$

$$\sqrt{x+3} > 0 \rightarrow x > -3 \rightarrow x \geq -\frac{3}{4} \Rightarrow D_f = [-\frac{3}{4}, +\infty) \rightarrow b = -\frac{3}{4}$$

$$a+1 - \sqrt{x+3} \leq 0 \rightarrow a - \sqrt{x+3} \leq -1 \xrightarrow{x = -\frac{3}{4}} a - \sqrt{(-\frac{3}{4}+3)} \leq -1 \rightarrow a \leq -1$$

$$\Rightarrow ab = -\frac{3}{4} \times (-1) = \frac{3}{4}$$

$$f(x) = x\sqrt{x+1} + \sqrt{1-x}, \quad f(x)+g(x) = \sqrt{2+x}\sqrt{1-x}, \quad D_f = D_g$$

سوال ۱۰

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$$g = \frac{f(x)}{4} - \frac{g(x)}{4}$$

$$D_f = D_g = \left[\begin{matrix} x+1 > 0 \rightarrow x > -1 \\ 1-x > 0 \rightarrow 1 > x \end{matrix} \right] \rightarrow D = [-1, 1]$$

x	$f(x)$	$g(x)$	$f(x)+g(x)$
1	$\sqrt{2}$	$-\sqrt{2}$	0
0	0	0	0
-1	$\sqrt{2}$	$\sqrt{2}$	$2\sqrt{2}$

$$\rightarrow R_g = [-\sqrt{2}, \sqrt{2}]$$

$$R_f = [\sqrt{2}, \sqrt{2}]$$

x	$f(x)$	$g(x)$	$\frac{f(x)-g(x)}{4}$
1	$\sqrt{2}$	$-\sqrt{2}$	$\sqrt{2}$ max
0	0	0	0
-1	$\sqrt{2}$	$\sqrt{2}$	0 min

$$R_y = [0, \sqrt{2}]$$