

مسئله ۱: تکلیف

نام: ایریسین ماروقیان
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مقطع: دهم پسر A
سوال ۱

الف) $f(x) = \sqrt{x|x|}$, $g(x) = x$ $\begin{cases} D_f =]-\infty; +\infty[\\ D_g = \mathbb{R} \end{cases} \Rightarrow$

ب) $f(x) = \frac{(x+3)(x+1)+x+4}{x^2+5x+6}$, $g(x) = 1$ $\begin{cases} D_f = \mathbb{R} \\ D_g = \mathbb{R} \end{cases}$

ج) $f(x) = \frac{x \sin^2 x - 5 \sin x}{x \sin x - 3}$, $g(x) = x \sin x$ $\begin{cases} D_f = \mathbb{R} - \{ \frac{\pi}{2} \} \\ D_g = \mathbb{R} \end{cases}$

د) $f(x) = \frac{x}{|x|}$, $g(x) = \frac{|x|}{x}$ $\begin{cases} D_f = \mathbb{R} - \{0\} \\ D_g = \mathbb{R} - \{0\} \end{cases}$

$f(-2) = -1 = g(-2) = -1 \checkmark$

الف) $f(x) = \left[\frac{x^2}{x^2+1} \right]$, $g(x) = [x - [x]]$ $\begin{cases} f(-1/2) = 0 \\ g(-1/2) = -2 \end{cases}$

ب) $f(x) = \frac{1}{[x]}$, $g(x) = \frac{1}{x[x]}$ $\begin{cases} f(1/2) = 1 \\ g(1/2) = 0 \end{cases}$

ج) $f(x) = \frac{1}{\sqrt{x-1}}$, $g(x) = \frac{1}{\sqrt{|x|-1}}$ $\begin{cases} D_f = (1; +\infty) \\ D_g = (-\infty; 0) \end{cases}$

د) $f(x) = \begin{cases} \frac{x^3-x}{x-1} & ; x \neq 1 \\ 2 & ; x = 1 \end{cases}$, $g(x) = x^2+x$

$f(-3) = \frac{-27+3}{-4} = 6$

$g(-3) = 9-3 = 6$

$f(1) = g(1)$

$f(x) + g(x) = x^2+x+1 \Rightarrow x f(x) = x(x^2+1)$

$f(x) - g(x) = x^2-x+1$

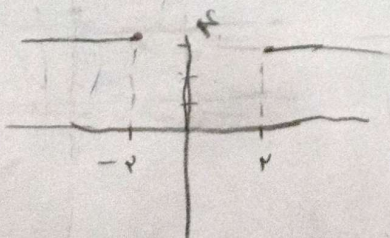
$g(x) = x^2+x+1-x^2-x+1 \Rightarrow g(x) = 2$

$f^2(x) - g^2(x) = (f(x)-g(x))(f(x)+g(x))$

$= (x^2-x+1)(x^2+x+1) = x^4 + x^2 + x^3 - x^2 - x - 1 + x^2 + x + 1$

$= x^4 + x^3 + 1$

$(x + \sqrt{x^2-4})(x - \sqrt{x^2-4}) = x^2 - (x^2-4) = 4$



تعیین علامت: $\frac{-2}{+} \frac{2}{-}$

$D = (-\infty; -2] \cup [2; +\infty)$

$$\frac{x-b}{r_1 r_2 - r_1 r_2 - 2} = \frac{r_1 a r_2 + t}{r_1 r_2 - r_1 m r_2 + r_1 n}$$

$$\rightarrow -r_1 m = -r_2 \Rightarrow m = \frac{r_2}{r_1}$$

$$\rightarrow r_1 n = -2 \Rightarrow n = -\frac{2}{r_1}$$

$$\rightarrow r_1 a = 1 \Rightarrow a = \frac{1}{r_1}$$

$$\rightarrow -b = t \Rightarrow b = -t$$

$$a m - b n = \frac{r_2}{r_1} - 1 = \frac{-r_2 r_1}{r_1}$$

سوال 8

د

$$\frac{b r_1 + r_2}{r_1 r_2 + b} = c$$

$$b r_1 + r_2 = 1 c r_1 + b c$$

$$\downarrow$$

$$r_1 + t \neq 0 \Rightarrow r_1 \neq -\frac{1}{t} \Rightarrow a \neq -\frac{1}{r_1}$$

$$\Rightarrow \wedge c = \frac{r_2}{r_1} \Rightarrow \wedge \frac{r_2}{r_1} = r_2 \Rightarrow c = \frac{1}{r_1} \Rightarrow c = \frac{1}{r_1}$$

$$\Rightarrow b r_2 = r_2 \Rightarrow b = \frac{r_2}{r_2} = 1$$

$$c = \pm \frac{1}{r_1}$$

$$\frac{-\frac{1}{r_1} \times t}{\frac{1}{r_1}} = -r_1 \Rightarrow \frac{a b}{c} = 'R - \{-\frac{1}{r_1}\}$$

پیدا

$$\frac{r_5}{t_5} = \frac{\{(r_1, 1), (r_2, 1), (-b, 1), (0, 0)\}}{\{(-1, -\frac{r_2}{r_1}), (r_2, \frac{r_2}{r_1}), (r_1, \frac{r_2}{r_1})\}} = \frac{\{(r_1, \frac{1}{r_1}), (r_2, \frac{r_2}{r_1}), (-1, \frac{1}{r_1})\}}{\{(-1, -\frac{r_2}{r_1}), (r_2, \frac{r_2}{r_1}), (r_1, \frac{r_2}{r_1})\}}$$

$$\rightarrow \text{مخرج} = \{ \frac{1}{r_1}, \frac{r_2}{r_1}, \frac{1}{r_1} \}$$

سوال 7

0

$$t = \{(-1, \frac{1}{r_1}), (r_2, \frac{r_2}{r_1}), (r_1, \frac{r_2}{r_1})\}$$

$$d = a \Rightarrow d = -1 \text{ و } a = -1$$

$$r_1 a - r_2 b = 1 \Rightarrow -r_2 b = t \Rightarrow b = -r_2$$

$$a - r_2 b = c \Rightarrow -1 + r_2 = c \Rightarrow c = r_2$$

$$\Rightarrow d + c = r_2$$

سوال 1

د

$$0 = \sqrt{-n^2 + n - m}$$

$$0 = -(n^2 - n + m)$$

$$\Delta = 0 \quad 1 - 4m = 0 \quad m = \frac{1}{4}$$

سوال 9

د

$$a = \frac{1}{r} \quad b = 0 \quad \left(a + b = \frac{1}{r} \right) \Rightarrow \left(n + \frac{1}{r} \right)^2 = 0 \quad \left[n = -\frac{1}{r} \right]$$

سوال 10

$$\frac{r_1 n + a}{n^2 + 5n + 6} = \frac{r_1 n + a}{(n-2)^2} \rightarrow n^2 + 5n + 6 = (n-2)^2$$

$$\rightarrow -r_2 c = 5 \Rightarrow c = -5$$

$$\rightarrow c^2 = b \Rightarrow b = 9$$

د

$$\frac{r_1 n + a}{9} = \frac{r_1}{r_2} \Rightarrow a = 9$$

$$a + b + c = 9 + 9 - 5 = 13$$