

الف) $f(x) = \sqrt{x+1}$, $g(x) = x$
 $R = [-1, \infty)$ $D_f \neq D_g$

ب) $f(x) = \frac{(x+3)(x+1)+x+2}{x^2+2x+1}$, $g(x) = 1$
 $R = \mathbb{R}$ $D_f = D_g$ $x=0 \rightarrow f(0) = \frac{4}{1} = 4$, $g(0) = 1$

ج) $f(x) = \frac{2\sin x - 4\sin x}{2\sin x - 1}$, $g(x) = 2\sin x$
 $R = \mathbb{R}$ $D_f = D_g$ $x=0 \rightarrow f(0) = \frac{2-4}{2-1} = -2$, $g(0) = 0$

د) $f(x) = \frac{x}{|x|}$, $g(x) = \frac{|x|}{x}$
 $R = \mathbb{R} \setminus \{0\}$ $D_f = D_g$ $x=0$ $\lim_{x \rightarrow 0} f(x) = \lim_{x \rightarrow 0} \frac{x}{|x|} = \frac{-1}{1} = -1$, $\lim_{x \rightarrow 0} g(x) = \lim_{x \rightarrow 0} \frac{|x|}{x} = \frac{1}{-1} = -1$

الف) $f(x) = \left[\frac{x^2}{x^2+1} \right]$, $g(x) = \left[x - [x] \right]$
 $R = \mathbb{R}$ $D_f = D_g$ $x=1 \rightarrow f(1) = \left[\frac{1}{2} \right] = 0$, $g(1) = \left[1 - [1] \right] = 0$

ب) $f(x) = \frac{1}{[x]}$, $g(x) = \frac{1}{x}$
 $R = \mathbb{R} \setminus \{0\}$ $D_f \neq D_g$ $x=1 \rightarrow f(1) = \frac{1}{[1]} = 1$, $g(1) = \frac{1}{1} = 1$

ج) $f(x) = \frac{1}{\sqrt{x-1}}$, $g(x) = \frac{1}{\sqrt{|x|-x}}$
 $R = [1, \infty)$ $D_f = D_g$ $x=2 \rightarrow f(2) = \frac{1}{\sqrt{1}} = 1$, $g(2) = \frac{1}{\sqrt{2-2}} = \frac{1}{0}$

د) $f(x) = \begin{cases} \frac{x^2-x}{x-1} & x \neq 1 \\ 2 & x = 1 \end{cases}$, $g(x) = \frac{x^2}{x}$
 $R = \mathbb{R}$ $D_f = D_g$ $x=1 \rightarrow f(1) = 2$, $g(1) = 1$

سوال ۳
 $f(x) + g(x) = x^2 + x + 1 \rightarrow g(x) = x^2$
 $f(x) - g(x) = x^2 + x + 1$
 $f(x) = x^2 + x + 1$
 $f'(x) = 2x + 1$
 $f(x) = x^2 + x + 1$

سوال ۵
 $f(x) = x - \sqrt{x^2-1}$
 $g(x) = x + \sqrt{x^2-1}$
 $f \cdot g = ?$
 $D_f \cap D_g = [1, \infty) \cup (-\infty, -1]$

$$f(x) = \frac{ax+r}{x^r-mx+n} = g(x) = \frac{x-b}{x^r-mx-a}$$

$$\frac{ax+r}{x^r-mx+n} \xrightarrow{x \rightarrow \infty} \frac{a}{-m} = \frac{b}{-a}$$

$$\frac{ax+r}{x^r-mx+n} = \frac{x-b}{(x-\frac{a}{m})(x+\frac{n}{m})}$$

$$am-bn = ?$$

$$-a = -a = -1$$

$$x^r-mx+n = (x+1)(ax+r) \rightarrow x^r-mx+n = ax^2+rx+ax+r \rightarrow x^r-mx+n = ax^2+(r+a)x+r$$

$$\frac{ax+r}{x^r-mx+n} = \frac{x-b}{(x+1)(x+1)}$$

$$f(x) = \frac{bx+r}{ax+b}$$

$$\frac{bx+r}{ax+b} = c \rightarrow bx+r = axc+bc$$

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$$\frac{ab}{c} = ?$$

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سوال ۲

$$f^{-1} = \{(1,2), (2,1), (3,4), (4,3)\}$$

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$$g = \{(1,2), (2,1), (3,4), (4,3)\}$$

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$$\frac{fg}{f+g} = ?$$

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سوال ۳

$$f = \{(1,a), (-r, ra-rb), (c,a), (r,rd)\}$$

$$d = a = -1$$

$$g = \{(1,1), (-r,1), (a-rb,a)\}$$

$$a-rb = c \rightarrow 1,4 = a = c$$

$$d+c = ?$$

$$-1+a = f$$

سوال ۴

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

$$g(x) = \{(a,b)\}$$

$$x = \frac{1 \pm \sqrt{1-4m}}{2}$$

$$b \in [0, \infty) \rightarrow (-\infty, \frac{1-\sqrt{1-4m}}{2}] \cup [\frac{1+\sqrt{1-4m}}{2}, \infty)$$

سوال ۵

$$f(x) = \frac{rx+a}{x^2+4x+b}$$

$$g(x) = \frac{r}{x-c}$$

$$\frac{rx+a}{x^2+4x+b} = \frac{r}{x-c}$$

$$\frac{rx+a}{x^2+4x+b} = \frac{r}{x-c}$$

$$a+b+c = ?$$

$$12, 12R-4R-R^2+R$$

$$R^2+R+12$$

$$R^2+R+12$$

$$R = c$$

سوال ۶