Subject: Year: Month: Day:

الف) $f(x)=\sqrt{x|x|}$, $g(x)=x$ $x|x|\geq 0 \Rightarrow D_f=\mathbb{R}^+\cup\{0\}$ $D_g=\mathbb{R}$ (X) ①

ب) $f(x)=\dfrac{(x+3)(x+1)+x+4}{x^2+5x+7}$, $g(x)=1$ $x^2+x+3x+3=x^2+4x+3=x^2+5x+7$

$\Delta<0$ ↓ $\mathbb{R}$ ✓ $\dfrac{x^2+5x+7}{x^2+5x+7}=1$ $f(x)=1$ (✓)

$g(x)=1$

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ج) $f(x)=\dfrac{4\sin^2x-6\sin x}{2\sin x-3}$, $g(x)=2\sin x$ $4\sin^2x-6\sin x=2\sin x(2\sin x-3)$

$2\sin x\neq 3$ $\mathbb{R}$ ✓ $f(x)=\dfrac{2\sin x(2\sin x-3)}{2\sin x-3}$ (✓)

$\sin x\neq \frac{3}{2}$ ✓$\mathbb{R}$ $g(x)=2\sin x$

د) $f(x)=\dfrac{x}{|x|}$, $g(x)=\dfrac{|x|}{x}$ $f(x)=2|x|\neq 0$ $x\neq 0$ $g(x)=2x\neq 0$ $D_f=D_g$ ✓

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$x=1$ $\frac{1}{1}=1$ $\frac{1}{1}=1$ ✓ $x=-1$ $\frac{-1}{1}=-1$ $\frac{1}{-1}=-1$ (✓)

ه) $f(x)=\left[\dfrac{x^2}{x^2+1}\right]$, $g(x)=[x-[x]]$ $x^2+1\neq 0$ $x^2\neq -1$ ✓$\mathbb{R}$

$g(x)=0$ ← $\mathbb{R}$ ✓ $D_f=D_g$ (✓)

$x^2\geq 0$ $x^2+1>0$ ← $0\leq f(x)<1$ ← $0\leq \frac{x^2}{x^2+1}<1$

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و) $f(x)=\dfrac{1}{[2x]}$, $g(x)=\dfrac{1}{2[x]}$ $[2x]\neq 0$ $0\leq 2x<1$ ⇐ $0\leq x<\frac{1}{2}$

$D_f=\mathbb{R}-[0,\frac{1}{2})$

$g(x)$ $2[x]\neq 0$ $[x]\neq 0$ $x\notin[0,1)$ $D_g=\mathbb{R}-[0,1)$ $D_f\neq D_g$ (X)

ز) $f(x)=\dfrac{1}{\sqrt{x-|x|}}$, $g(x)=\dfrac{1}{\sqrt{|x|-x}}$ $f(x)$ $x-|x|>0$ $x>|x|$

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$D_f=\phi$ (X)

$|x|>x$ $D_g=\mathbb{R}^-$ $D_g\neq D_f$

ح) $f(x)=\begin{cases} x^2 \end{cases}$

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

$f(x) = \frac{x^3-x}{x-1} = \frac{x(x^2-1)}{x-1} = \frac{(x-1)(x+1)x}{x-1} = x(x+1) = x^2+x = g(x)$ $g(x) = \mathbb{R}$ $g(1)=2$ ✓

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

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

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

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

$(x^2 - x + 1) \times (x^2 + x + 1) = ((x^2+1)+x) \times ((x^2+1) - x) = (x^2+1)^2 - x^2 =$

$x^4 + 2x^2 + 1 - x^2 = x^4 + x^2 + 1$

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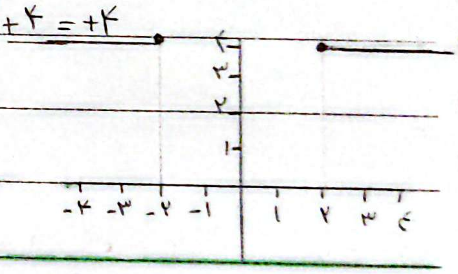
$f(x) \Rightarrow x^2 \geq 4$ $x \geq 2$, $x \leq -2$ $= D_f$ $g(x) = x^2 \geq 4$ $x \geq 2$, $x \leq -2$ $= D_g$

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



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$D_f = D_g$ D_g: $2x^2 - 3x - 5 \neq 0$ $\Delta = 9 - 4(-5 \times 2) = +49$

$\frac{-(-3) \pm \sqrt{49}}{4} = \frac{3 \pm 7}{4}$ → $x = 2.5$, → $x = -1$ $D_g = \mathbb{R} - \{x \mid x = 2.5, x = -1\}$

ریشه‌هاش ۱- و ۲,۵

$x^2 - mx + n$ ← $(x+1)(x-2.5) = x^2 - mx + n$ $n = -2.5 \times 1 = -2.5$

$m = 1 - 2.5 = 1.5$

$x^2 - 1.5x - 2.5 = 0$

$2ax^3 - 3ax^2 - 5ax + 4x^2 - 6x - 10 = 1x^3 - 1.5x^2 - \frac{5}{2}x - bx^2 - 1.5bx$

$2a = 1$ $a = 0.5$

$-3a + 4 = -1.5 - b$ $-1.5 + 4 + 1.5 = -b$ $b = -4$

am - bn

$\frac{1}{2} \times \frac{3}{2} - 4 \times -\frac{5}{2} = -\frac{91}{4}$

$\frac{3}{4}$ ← سوال ۶ ام صفحه بعد!

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۷_ $f = (-1,2),(2,4),(3,-2),(0,0.5)$ $\frac{-4\times2}{2-4}=4$ $\frac{2\times4}{4\times4}=$

$g:(2,6)(3,9)(-1,4)(5,0)$

$\frac{2g}{f+g} = \{(-1,4),(2,1),(3,3)\}$

۸_ 5 $g=\{(2,-1),(-3,1),(a-3b,5)\}$

$f=\{(2,a),(-3,3b-2b),(c,5),(2,d)\}$

$a=-1$ $a-3b=-1-(3\times-2)=5$

$3(-1)-2b=1+3 \quad =-2 \quad b=-2 \quad d=-1 \quad c=5 \quad -1+5=(4)$

۹_ 10 $D_g=\{a\} \Rightarrow f(x)=g(x) \Rightarrow D_g=D_f=\{a\}$ ← $-x^2+x-m$ ← تنها یک ریشه دارد

$f(x)=\sqrt{-x^2+x-\frac{1}{4}}=\sqrt{-(x^2-x+\frac{1}{4})}=\sqrt{-(x-\frac{1}{2})^2}$ (در زمانی که ریشه مضاعف) $\Delta=0$

$D_f=\{\frac{1}{2}\}=D_g \Rightarrow a=\frac{1}{2}$ نامنفی باشد $1^2-4m \Rightarrow 1=4m \quad m=\frac{1}{4}$

$\sqrt{-a^2+a-m}=b \quad b=0$ $x=\frac{1}{2}$ $a+b=\frac{1}{2}+0=\frac{1}{2}$

۱۰_ 15 $D_g=x-c\neq0 \quad x\neq c$ برابر $=D_f$ $x^2+6x+b=(x-c)^2$ $b=9$ ← مربع کامل

$x^2+6x+9=(x+3)^2 \Rightarrow c=-3$ $(x-3)^2$ $c=3$

$x=1$ $\frac{2\times6}{4\times6}=\frac{2+a}{x^2+6x+b}=\frac{}{16}$ $8=2+a$ $a=6$

$6+-3+9=12$

(۹)

$f(x)=8x\neq-b$ $x\neq\frac{-b}{8} \Rightarrow D_f=\mathbb{R}-\{\frac{-b}{8}\}=D_g \Rightarrow a=\frac{-b}{8}$ | $\frac{a_1b_1}{c_1}=\frac{-\frac{1}{2}\times4}{\frac{1}{2}}=-4$ 20

$8cx+bc=bx+2$

$8c=b \quad c=\frac{b}{8} \quad bc=2 \quad b=\frac{2}{c}$ | $\frac{a_2b_2}{c_2}=\frac{+\frac{1}{2}\times-4}{-\frac{1}{2}}=+4$

$8c\times c=2 \quad c^2=\frac{1}{4} \Rightarrow c=\pm\frac{1}{2} \quad c_1=\frac{1}{2} \quad c_2=-\frac{1}{2}$

$b_1=\frac{1}{2}\times8=4 \quad b_2=-\frac{1}{2}\times8=-4$

$a_1=\frac{-4}{8}=-\frac{1}{2} \quad a_2=\frac{+4}{8}=\frac{1}{2}$

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