تکلیف ۸ ،　　　　۱۴/۵　　　　به نام خدا　　　　یکتا دهقانی / دوازدهم دختر A

$g(x)=\sqrt{-x^2+4x-4}$, $f(x)=\sqrt{\log_2^{(x-1)}}$, $D_{gof}=?$　　1

$D_{gof}=\{x\in D_f \cap f(x)\in D_g\}$

$x\in D_f \to$ I $x-1>0 \to \boxed{x>1}$, II $\log_2^{x-1}\geq 0 \to x-1\geq 1$

$\to \boxed{x\geq 2}$ $\xrightarrow{\text{I}\cap\text{II}}$ $[2,+\infty)\in x$

$f(x)\in D_g \to D_g=\sqrt{-(x-2)^2} \to x-2=0 \to x=2 \to D_g=\{2\}$

$\Rightarrow \sqrt{\log_2^{(x-1)}}=2 \to \log_2^{x-1}=4 \to x-1=16 \to x=17$

$\Rightarrow D_{fog}=\{17\}\cap[2,+\infty) \to D_{fog}=\{17\} \to$ ۱.

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$g(x)=x^2-3x+8$, $f(x)=2x-5 \Rightarrow fog(x)=gof(x)$ (۲)

$fog(x)=f(g(x))=2(x^2-3x+8)-5=2x^2-6x+16-5$

$=\boxed{2x^2-6x+11}$

$gof(x)=g(f(x))=(2x-5)^2-3(2x-5)+8=$

$4x^2+25-20x-6x+15+8=\boxed{4x^2-26x+48}$

$\Rightarrow gof(x)=fog(x) \Rightarrow 2x^2-6x+11=4x^2-26x+48$

$\rightarrow 2x^2-20x+37=0 \longrightarrow \alpha , \beta =$ ریشه‌ها

$\alpha^2+\beta^2=S^2-2P=\left(\frac{+20}{2}\right)^2-2\left(\frac{37}{2}\right)=100-37=63$ ✓

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$f(x)=2x$, $gof(x)=5x^2+11 \longrightarrow \min g(x+7)=?$ (۳)

$2x=t \rightarrow x=\frac{t}{2} \Rightarrow$ در gof به جای x ، $\frac{t}{2}$ می‌گذاریم

$5\left(\frac{t}{2}\right)^2+11=\frac{5t^2}{4}+11=\frac{5}{4}t^2+11 \longrightarrow g(x)=\frac{5}{4}x^2+11$

$g(x-7)=\frac{5}{4}\times(x-7)^2+11=\frac{5}{4}(x^2-14x+49)+11$

$\longrightarrow g(x+7)=\frac{5}{4}x^2-\frac{70}{4}x+\frac{289}{4} \xrightarrow{a>0}$ min ext: طول $=\frac{-b}{2a}$

$\rightarrow$ طول $=\frac{\frac{+70}{4}}{\frac{10}{4}}=+7 \xrightarrow{x=+7} \frac{245}{4}-\frac{490}{4}+\frac{289}{4}=\frac{44}{4}=11$ ✓

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$f(x)=3x-4\ ,\ fog(x)=3x^2-6x-1 \rightarrow gof(x)=?$ ٤

$fog(x)=3g-4=3x^2-6x-1 \longrightarrow g=\dfrac{3x^2-6x+3}{3}$ ۲

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

$gof \Rightarrow (3x-4-1)^2=(3x-5)^2=9x^2-30x+25=gof(x)$ ✓ ۱۲

$2g(x)=4f(x)-14 \longrightarrow a=? \Longrightarrow \underset{f-g}{\text{نمودار}}=-x+5$ ۵

$\begin{cases} f-g=-x+5 \xrightarrow{\times 2} 2f-2g=-2x+10 \\ 2g-4f=-14 \xrightarrow{\times 1} 2g-4f=-14 \end{cases} \longrightarrow f(x)=2x+4 \ ,\ g(x)=3x-1$

$fog(x)=f(g(x))=2(3x-1)+4=6x-2+4=6x+2$

$y=0 \longrightarrow 6x+2=0 \longrightarrow x=-\frac{1}{3}=a$ ✓ $\rightarrow$ ؟ ۲

$f(x)=9^x\ ,\ g(x)=\log_3 x \longrightarrow fog(x)\leq gof(x)$ ٦

$fog(x)=9^{\log_3 x} \qquad a^{\log_c b}=b^{\log_c a} \rightarrow x^{\log_3 9}=x^2$

$gof(x)=\log_3 9^x \qquad \log_a b^c=c\log_a b \rightarrow x\log_3 9=2x$

$\rightarrow fog\leq gof \rightarrow x^2\leq 2x \rightarrow x^2-2x\leq 0 \longrightarrow \begin{array}{ccccc} & 0 & & 2 & \\ + & 0 & - & 0 & + \end{array}$

$\rightarrow x\in[0,2] \rightarrow 0,1,2 \rightarrow$ ✓ $\{3\} \rightarrow$ ؟ ۲

$f\left(\dfrac{x^2-2}{x}\right)=x^2+x-4-\dfrac{2}{x}+\dfrac{4}{x^2} \longrightarrow f(x)=?$ ۷

$f\left(x-\frac{2}{x}\right)=\left(x-\frac{2}{x}\right)+\left(x^2+\frac{4}{x^2}-4\right)=\left(x-\frac{2}{x}\right)+\left(x-\frac{2}{x}\right)^2$

$x-\frac{2}{x}=t \longrightarrow f(t)=t+t^2 \xrightarrow{t=x} f(x)=x^2+x \rightarrow$ ؟

✓ ۲

Senobar

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$A \cap B = ?$

$g(x) = 8x - x^2$, $f(x) = \log_2 x \rightarrow A = D_{fog}$, $B = R_{fog}$ ۵

$D_{fog}(x) = \{x \in D_g \wedge g(x) \in D_f\}$

I) $x \in D_g \rightarrow D_g = \mathbb{R} \rightarrow x \in \mathbb{R}$

II) $g(x) \in D_f \rightarrow D_f \Rightarrow x > 0 \xrightarrow{x = f(x)} 8x - x^2 > 0 \rightarrow$ $\overset{0 \quad 8}{- \,|\, + \,|\, -}$ $\rightarrow (0, 8)$

$\xrightarrow{8} \boxed{D_{fog} = (0, 8) = A}$

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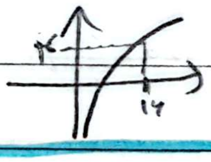
$R_{fog}(x) = R_f \xrightarrow[\text{د}]{\text{برد جزئی}} x \in D_{fog} \longrightarrow \log_2^{8x - x^2} = fog$

$R(8x - x^2) \rightarrow \frac{-b}{2a} = 4 \xrightarrow{x = 4} 32 - 16 = 16 \rightarrow R_g = (0, 16)$

$\log_2 x' \xrightarrow{x' \in (0, 16)}$  $\rightarrow R_{fog} = (-\infty, 4) \cap (0, 8) = (0, 4)$

~~جواب~~ ۱و۲و۳ ← ۴ جواب

$fof = 1 - 3f^2(x)$, $g(x) = x - 1$, $h(x) = x^3 + 2x + 1 \rightarrow h(g(x)) = f(x)$ ۲

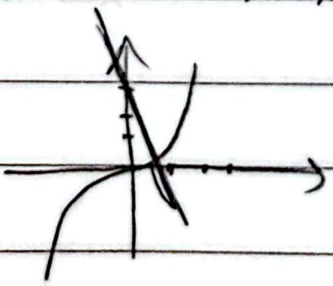
$fof = f(f(x)) = 1 - 3f^2(x) \longrightarrow f(x) = 1 - 3x^2$

$h(g(x)) = (x-1)^3 + 2(x-1) + 1 = x^3 - 3x^2 + 3x - 1 + 2x - 2 + 1$

$\rightarrow h(g(x)) = x^3 - 3x^2 + 5x - 2$

$\rightarrow h(g(x)) = f(x) \rightarrow x^3 - 3x^2 + 5x - 2 = 1 - 3x^2$

$\rightarrow x^3 + 5x - 3 = 0 \rightarrow x^3 = 3 - 5x$

$\xrightarrow{\text{با شکل}}$  $\rightarrow$ یک نقطه برخورد $\rightarrow$ $\boxed{\text{یک ریشه}} \rightarrow 1.$

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Senobar

$f(x) = x - \frac{4}{x} \;,\; gof(x) = ax^2 + 3x \;,\; g(3) = 8 \longrightarrow a = ?$ 10

$gof = g(f(x)) \xrightarrow{\text{اگر}} g(3) = g(f(x)) \rightarrow f(x) = 3$

$\frac{x^2 - 4}{x} = 3 \rightarrow x^2 - 4 = 3x \rightarrow x^2 - 3x - 4 = 0 \rightarrow (x-4)(x+1) = 0$

$x = 4 \qquad x = -1$

اگر $x = 4 \longrightarrow gof(4) = 8 = 16a + 8 \rightarrow \boxed{a = 0}$

اگر $x = -1 \rightarrow gof(-1) = 8 = -a - 3 \longrightarrow \boxed{a = -10}$

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