

$$f(a) - (a+1)(a+2) = V(a+1) = Va + V(I)$$

$$f(-2) = 3a + 2(-2) = 3a - 4 \quad (II)$$

$$\xrightarrow{\text{جابجایی}} 2(Va + V) = 3a - 4 + a \rightarrow 14a + 4 = 3a - 4 \rightarrow \boxed{a = -1, 1}$$

$$\star \text{ از آنجایی که } 2 - \sqrt{2} = \frac{1}{2 + \sqrt{2}} \leftarrow (2 - \sqrt{2})(2 + \sqrt{2}) = 1$$

$$\left. \begin{aligned} f(2 - \sqrt{2}) &= \sqrt{2 - \sqrt{2}} + \frac{1}{\sqrt{2 - \sqrt{2}}} + 2 \\ f(2 + \sqrt{2}) &= \sqrt{2 + \sqrt{2}} + \frac{1}{\sqrt{2 + \sqrt{2}}} + 2 \end{aligned} \right\} \xrightarrow{+} \sqrt{2 - \sqrt{2}} + \sqrt{2 + \sqrt{2}} + \sqrt{2 + \sqrt{2}} + \sqrt{2 - \sqrt{2}} + 4$$

$$\xrightarrow{+} 2(\sqrt{2 - \sqrt{2}} + \sqrt{2 + \sqrt{2}}) + 4 = \boxed{2\sqrt{6} + 4}$$

$$(\sqrt{2 - \sqrt{2}} + \sqrt{2 + \sqrt{2}})^2 = \sqrt{6}$$

$$\begin{aligned} x^2 \rightarrow 2f(x) - 4f(-x) &= 4x^2 - x \leftarrow x \text{ از } f \\ x^2 \rightarrow 2f(-x) - 4f(x) &= 4x^2 + x \leftarrow -x \text{ از } f \end{aligned} \left\} \xrightarrow{+} -2f(x) = 2x^2 + x$$

$$\rightarrow f(x) = -\frac{2}{2}x^2 - \frac{x}{2} \rightarrow \boxed{f(x) = -x^2 - \frac{x}{2}}$$

$$x=0 \rightarrow 2f(0) = 3m - 1 \rightarrow f(0) = \frac{3m-1}{2}$$

$$x=-2 \rightarrow 4f(0) = 1\omega + \omega m \rightarrow f(0) = \frac{1\omega + \omega m}{4}$$

$$\frac{3m-1}{2} = \frac{1\omega + \omega m}{4} \Rightarrow m = \frac{9}{2} \rightsquigarrow \boxed{f(0) = \frac{3 \times \frac{9}{2} - 1}{2} = \frac{4\omega}{2}}$$

$$\frac{3x^2 - 12x + 2}{x} = 2x - 12 + \frac{2}{x}$$

$$f(x) = ax + b \Rightarrow a\left(x + \frac{1}{x}\right) + 2b$$

$$\left\{ \begin{aligned} a &= 2 \\ b &= -6 \\ f(-1) &= -2-6 = \boxed{-8} \end{aligned} \right. \leftarrow \star \text{ از آنجایی که } f(x) = f\left(\frac{1}{x}\right)$$

$$\star f\left(\frac{1}{x}\right) = \frac{a}{x} + b, f(x) = ax + b \Rightarrow f(x) + f\left(\frac{1}{x}\right) = ax + b + \frac{a}{x} + b = a\left(x + \frac{1}{x}\right) + 2b$$

$\left. \begin{aligned} f(x) &= (x-1)\sqrt{1-x} \\ g(x) &= -\sqrt{(1-x)^3} \end{aligned} \right\} \begin{aligned} g(x) &= \sqrt{(1-x)^2(1-x)} = 1-x \sqrt{1-x} \\ 1-x \geq 0 &\Rightarrow x \leq 1 \Rightarrow 1-x = 1-x \end{aligned}$ $g(x) = -(1-x)\sqrt{1-x} \Rightarrow (x-1)\sqrt{1-x} \Rightarrow \boxed{g(x) = f(x) \quad (x \leq 1)}$	٦
$\left\{ \begin{aligned} f(x) &= x\sqrt{x} \rightarrow f(x) = x\sqrt{x} \rightarrow x \geq 0 \\ g(x) &= \sqrt{x^3} \rightarrow g(x) = \sqrt{x^2} \sqrt{x} \rightarrow \sqrt{x^2} = x \rightarrow x \geq 0 \end{aligned} \right\} \rightarrow \sqrt{x^3} = x\sqrt{x}$ $\star f(x) = g(x) \xrightarrow{D} [0, \infty)$	٧
$\left\{ \begin{aligned} f(x) &= [\sqrt{x} - [\sqrt{x}]] \rightarrow \sqrt{x} - [\sqrt{x}] \geq 0 \rightarrow D: [0, \infty) \\ g(x) &= \sqrt{x - x } \rightarrow x - x \geq 0 \rightarrow x \geq x \rightarrow x \geq 0 \end{aligned} \right\}$ $D_g = D_f \rightarrow \boxed{f(x) = f(g)} \quad \boxed{0 = R_g = R_f \star}$	٨
الف) $\left(\frac{f+g}{f-g}\right)(1) = \frac{f(1)+g(1)}{f(1)-g(1)} = \frac{1+1}{1-1} = \infty$ ب) $\left(\frac{f+g}{f-g}\right)(2) = \frac{f(2)+g(2)}{f(2)-g(2)} = \frac{2+2}{2-2} = \frac{4}{0} = \infty$ ج) $f(x)g(-1) = 0 \times 2 = 0$	٩
الف) $g(x) = f(x-1) \rightarrow \begin{cases} \textcircled{1} x-1=2 \rightarrow x=3 \\ \textcircled{2} x-1=0 \rightarrow x=1 \\ \textcircled{3} x-1=-1 \rightarrow x=0 \\ \textcircled{4} x-1=-2 \rightarrow x=-1 \end{cases}$ $= \left\{ (1,1)(0,4)\left(-\frac{1}{2},2\right)\left(\frac{1}{2},4\right)\left(\frac{3}{2},-1\right) \right\}$ ب) $h(x) = f(x) \rightarrow x \leq 0 \rightarrow x=0 \quad x =2 \rightarrow x=\pm 2 \quad x =4 \rightarrow x=\pm 4$	١٠

$$h = \left\{ (-3,-1)(-2,1)(0,4)(2,1)(4,-1) \right\}$$