

الف) $g^3 = 2x^2 - 1 \Rightarrow \begin{cases} g_1^3 = 2x_1^2 - 1 \\ g_2^3 = 2x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} g_1^3 = g_2^3 \rightarrow \boxed{g_1 = g_2}$ تابع است ✓ (2)

ب) $g + g = 3x^2 - 1 \Rightarrow \begin{cases} g_1^3 + g_1 = 3x_1^2 - 1 \\ g_2^3 + g_2 = 3x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} g_1^3 + g_1 = g_2^3 + g_2 \rightarrow g_1^3 - g_2^3 + g_1 - g_2 = 0$
 $(g_1 - g_2)(g_1^2 + g_1 g_2 + g_2^2) + (g_1 - g_2) = 0$
 $(g_1 - g_2)(g_1^2 + g_1 g_2 + g_2^2 + 1) = 0$
 $g_1 - g_2 = 0 \rightarrow \boxed{g_1 = g_2}$
 $g_1^2 + g_1 g_2 + g_2^2 + 1 = 0 \times$
 $-g_2 \pm \sqrt{g_2^2 - (4g_2 + 4)}$
 $\frac{g_2^2 - 4g_2 - 4}{2} = -g_2 \pm \sqrt{-3g_2^2 - 4g_2 - 4}$
 $= -g_2 \pm \sqrt{-3g_2^2 - 4g_2 - 4}$
 $\frac{-g_2 \pm \sqrt{-3g_2^2 - 4g_2 - 4}}{-g_2 \pm \sqrt{-3g_2^2 - 4g_2 - 4}}$
 چون دلتا همیشه منفی است، رابطه مرتبه دوم نیست و تابع است ✓ تابع است ✓

الف) $g = x^2 - 1 \Rightarrow \begin{cases} g_1 = x_1^2 - 1 \\ g_2 = x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} \boxed{g_1 = g_2}$ تابع ✓ (2)

ب) $|g| + xg = x^2 + 1 \xrightarrow{x=0} |g| = 0 + 1 \rightarrow \begin{cases} g = 1 \\ g = -1 \end{cases}$ تابع نیست ✗

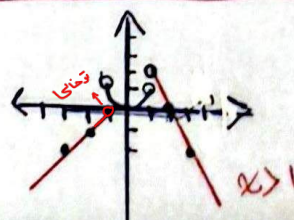
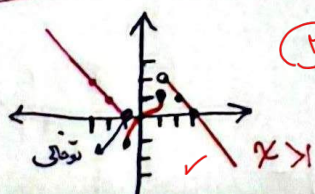
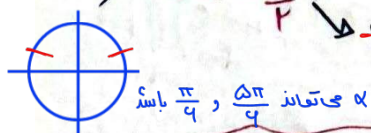
ج) $g^3 + x^3 = 2x - 1 \Rightarrow \begin{cases} g_1^3 = 2x_1 - x_1^3 - 1 \\ g_2^3 = 2x_2 - x_2^3 - 1 \end{cases} \xrightarrow{x_1=x_2} g_1^3 = g_2^3 \rightarrow \boxed{g_1 = g_2}$ تابع ✓
 $g^3 = 2x - x^3 - 1$

د) $\sqrt[3]{g} + \sqrt[3]{x} = 2 \Rightarrow \begin{cases} \sqrt[3]{g_1} = 2 - \sqrt[3]{x_1} \\ \sqrt[3]{g_2} = 2 - \sqrt[3]{x_2} \end{cases} \xrightarrow{x_1=x_2} \sqrt[3]{g_1} = \sqrt[3]{g_2} \rightarrow \boxed{g_1 = g_2}$ تابع ✓
 $\sqrt[3]{g} = 2 - \sqrt[3]{x}$

الف) $\tan \frac{\pi}{4} = 1 \Rightarrow \frac{\sin}{\cos} = 1 \Rightarrow \frac{y}{x} = 1 \Rightarrow y = x$ ✓
 ب) $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \Rightarrow \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓
 ج) $\tan \frac{\pi}{4} = 1 \Rightarrow \frac{\sin}{\cos} = 1 \Rightarrow \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓
 د) $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} \Rightarrow \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓ (2)

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 ج) $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓
 د) $\cos \frac{\pi}{4} = \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}} = \frac{1}{\sqrt{2}}$ ✓

الف) $\sin \alpha = \frac{1}{2} \Rightarrow \alpha = \frac{\pi}{6}, \frac{5\pi}{6}$
 ب) $\cos \alpha = \frac{\sqrt{2}}{2} \Rightarrow \alpha = \frac{\pi}{4}, \frac{7\pi}{4}$
 ج) $\tan \alpha = 1 \Rightarrow \alpha = \frac{\pi}{4}, \frac{5\pi}{4}$
 د) $\cot \alpha = 1 \Rightarrow \alpha = \frac{\pi}{4}, \frac{5\pi}{4}$



الف) $g = \frac{(x^2-2)(x^3-2)(x^4-2)}{x^2 \cdot x^3 \cdot x^4}$ النسبة جاذبي

Sign chart: $- \quad + \quad - \quad +$ ✓

ب) $g = \frac{(x^2-2)(x^3-2)(x^4-2)}{x^2 \cdot x^3 \cdot x^4}$

Sign chart: $+ \quad - \quad - \quad +$ ✓

الف) $g = \frac{(x^2-2)(x^3-2)(x^4-2)}{x^2 \cdot x^3 \cdot x^4}$

Sign chart: $- \quad + \quad - \quad +$ ✓

ب) $g = \frac{(x^2-2)(x^3-2)(x^4-2)}{x^2 \cdot x^3 \cdot x^4}$

Sign chart: $+ \quad - \quad - \quad +$ ✓

الف) $g = \frac{x^4 - 3x^2 + 2}{x^2 - 4} = \frac{(x-1)^2(x+2)}{(x-2)(x+2)}$ تجزیه کامل

Sign chart: $+ \quad - \quad - \quad +$ ✓

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

Sign chart: $+ \quad - \quad - \quad +$ ✓

$g = \frac{x^4 - x^2}{x^2 + x + 2} = \frac{x^2(x^2 - 1)}{x^2 + x + 2}$

Sign chart: $+ \quad - \quad - \quad +$ ✓

ب) $g = \frac{x^4 + 3x^2 + 2}{x^2 + 2x + 3} = \frac{(x^2 + 2x + 3)(x^2 + 2x + 3)}{x^2 + 2x + 3}$

Sign chart: $+ \quad - \quad - \quad +$ ✓

صورت و مخرج هر دو مثبت هستند
در نتیجه علامت همواره مثبت است.