

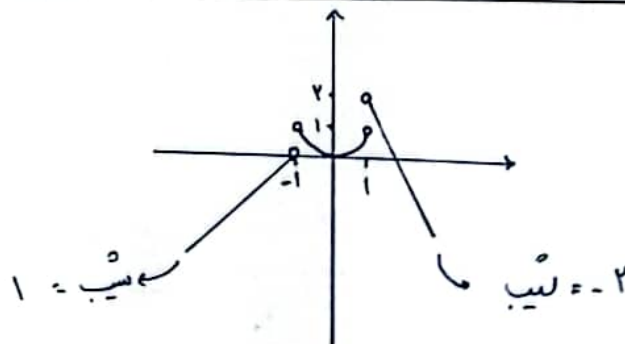
الف) $y^3 = 2x^2 - 1 \rightarrow \begin{cases} y_1^3 = 2x_1^2 - 1 \\ y_2^3 = 2x_2^2 - 1 \end{cases} \xrightarrow{if(x_1=x_2)} y_1^3 = y_2^3 \rightarrow y_1 = y_2 \rightarrow \text{تابع است}$
 ب) $y^3 + y = 2x^2 + 1 \rightarrow \begin{cases} y_1^3 + y_1 = 2x_1^2 + 1 \\ y_2^3 + y_2 = 2x_2^2 + 1 \end{cases} \xrightarrow{if(x_1=x_2)} y_1^3 + y_1 = y_2^3 + y_2 \rightarrow y_1^3 - y_2^3 + y_1 - y_2 = 0$
 $\Rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + y_1 - y_2 = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$
 $\Rightarrow y_1 - y_2 = 0 \rightarrow y_1 = y_2$ هواره مسب
 $y_1^2 + y_1 y_2 + y_2^2 + 1 = \frac{(y_1 + y_2)^2 + y_1^2 + y_2^2}{2} + 1$

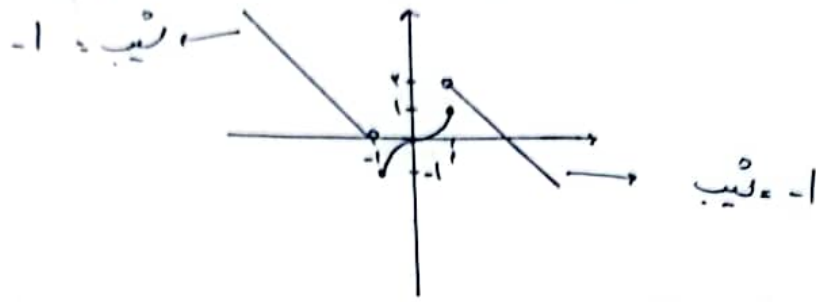
الف) $y = x^2 - 1 \rightarrow$  تابع است
 ب) $|y| + xy = x^2 + 1 \xrightarrow{x=0} |y| = 1 \rightarrow y = \pm 1 \rightarrow$ تابع نیست
 ج) $y^3 + x^3 = 2x - 1 \rightarrow \begin{cases} y_1^3 = -x_1^3 + 2x_1 - 1 \\ y_2^3 = -x_2^3 + 2x_2 - 1 \end{cases} \xrightarrow{if(x_1=x_2)} y_1^3 = y_2^3 \rightarrow y_1 = y_2 \rightarrow \text{تابع است}$
 د) $\sqrt[3]{y} + \sqrt[3]{x} = 2 \rightarrow \begin{cases} \sqrt[3]{y_1} = -\sqrt[3]{x_1} + 2 \\ \sqrt[3]{y_2} = -\sqrt[3]{x_2} + 2 \end{cases} \xrightarrow{if(x_1=x_2)} \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2 \rightarrow \text{تابع است}$

الف) $\tan \frac{\pi}{3} = \sqrt{3}$ ب) $\cot \frac{\sqrt{3}\pi}{4} = \sqrt{3}$
 ج) $\tan 330^\circ = -\frac{\sqrt{3}}{3}$ د) $\cot 180^\circ =$ تعریف نشده

الف) $\sin \alpha = \frac{1}{4} \rightarrow \begin{cases} \alpha = \frac{\pi}{4} \\ \alpha = \frac{5\pi}{4} \end{cases}$ $0 \leq \alpha < 2\pi$

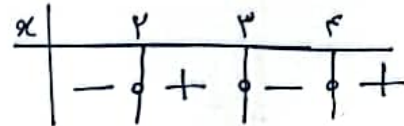
ب) $\cos \alpha = \frac{\sqrt{2}}{3} \rightarrow \begin{cases} \alpha = \frac{\pi}{4} \\ \alpha = \frac{\sqrt{2}\pi}{3} \end{cases}$





الف) $y = (x-2)(x-3)(x-4)$

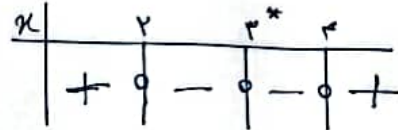
۲ ← ۳ ← ۴ ←



ب) $y = (x-2)(x-3)^2(x-4)$

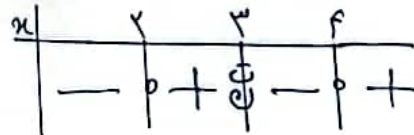
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ریشه مضاعف



الف) $y = \frac{(x-2)(x-4)}{x-3}$

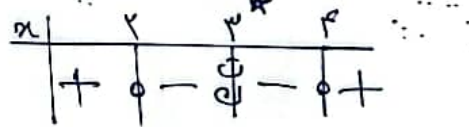
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ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$

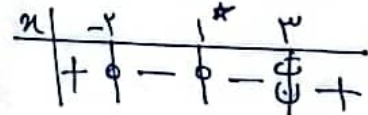
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ریشه مضاعف



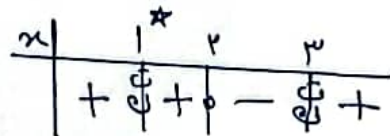
الف) $y = \frac{x^3 - 3x + 2}{x-3} \rightarrow y = \frac{(x-1)(x-1)(x+2)}{x-3}$

۱ ← ۳ ← -۲



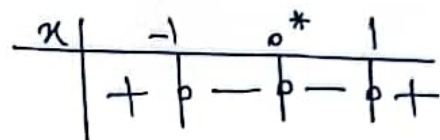
ب) $y = \frac{x^2 - 2x + 1}{x^2 - 4x + 3} \rightarrow y = \frac{(x-1)(x-1)}{(x-3)(x-1)}$

۲ ← ۱ ← ۳ ← ۱ ←



الف) $y = \frac{x^2 - x^2}{x^2 + x + 2} \rightarrow y = \frac{x^2(x-1)(x+1)}{x^2 + x + 2}$

۰* ← ۱ ← -۱



ب) $y = \frac{x^2 + 3x + 3}{x^2 + 2x + 3}$

چون دلتای صورت و مخرج منفی است، معادله ریشه ندارد و جواب هواره مثبت است.