

الف) $\begin{cases} y_1^3 = x_1^3 - 1 \\ y_2^3 = x_2^3 - 1 \end{cases} \quad \begin{cases} x_1 = x_2 \\ y_1 = y_2 \end{cases} \rightarrow y_1 = y_2 \rightarrow y = y$ ✓

ب) $\begin{cases} y_1^3 + y_2^3 = x_1^3 - 1 \\ y_1^3 + y_2^3 = x_2^3 - 1 \end{cases} \quad \begin{cases} x_1 = x_2 \\ y_1 + y_2 = 1 + y_2 \end{cases} \rightarrow y_1 = y_2 \rightarrow y = y$ ✓

چرا؟ باید راه حل کامل مثل جنده بنویس!

الف) $|y_1 + ay| = x^2 + 1 \rightarrow |y_1| = x^2 + 1 - ay$ (البته) $y = x^2 - 1$ ✓
 (ب) $\begin{cases} y_1^2 = x_1^2 + 1 - ay_1 \\ y_2^2 = x_2^2 + 1 - ay_2 \end{cases} \quad \begin{cases} x_1 = x_2 \\ y_1 = y_2 \end{cases} \rightarrow y_1 = y_2$ ✓
 (ج) $\begin{cases} y_1^2 = x_1^2 + 1 - ay_1 \\ y_2^2 = x_2^2 + 1 - ay_2 \end{cases} \quad \begin{cases} x_1 = x_2 \\ y_1 = y_2 \end{cases} \rightarrow y_1 = y_2$ ✓

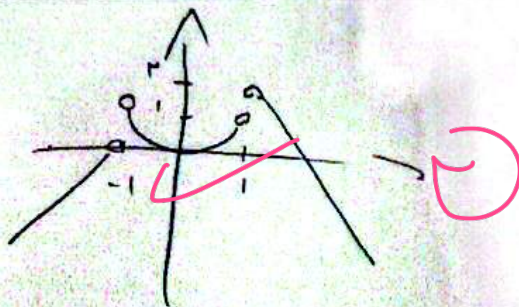
الف) $\tan \frac{\pi}{4} = 1$ ✓ $\frac{\sin \theta}{\cos \theta} = 1 \rightarrow \frac{\sqrt{2}}{\sqrt{2}} = 1$ ✓
 ب) $\cot \frac{5\pi}{4} = 1$ ✓ $\frac{\cos \theta}{\sin \theta} = 1 \rightarrow \frac{-\sqrt{2}}{-\sqrt{2}} = 1$ ✓
 ج) $\tan \frac{3\pi}{4} = -1$ ✓ $\frac{\sin \theta}{\cos \theta} = -1 \rightarrow \frac{\sqrt{2}}{-\sqrt{2}} = -1$ ✓
 د) $\cot \frac{7\pi}{4} = 1$ ✓ $\frac{\cos \theta}{\sin \theta} = 1 \rightarrow \frac{\sqrt{2}}{\sqrt{2}} = 1$ ✓

ب) $\cot \frac{5\pi}{4} = \frac{\cos \frac{5\pi}{4}}{\sin \frac{5\pi}{4}} = \frac{-\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = 1$ ✓
 ج) $\tan \frac{3\pi}{4} = \frac{\sin \frac{3\pi}{4}}{\cos \frac{3\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = -1$ ✓

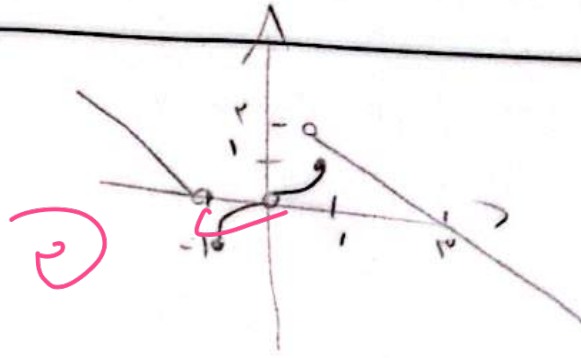
ب) $\cos \alpha = \frac{\sqrt{2}}{2}$ ✓
 $\alpha \in [0, 2\pi]$
 $\alpha = \left\{ \frac{\pi}{4}, \frac{7\pi}{4} \right\}$ ✓

الف) $\sin \alpha = \frac{1}{\sqrt{2}}$ ✓
 $\alpha \in [0, 2\pi]$
 $\alpha = \left\{ \frac{\pi}{6}, \frac{5\pi}{6}, \frac{7\pi}{6}, \frac{11\pi}{6} \right\}$ ✓

$-2 < x < 1$
 $x^2 - 1 < x < 1$
 $x + 1 < x < -1$



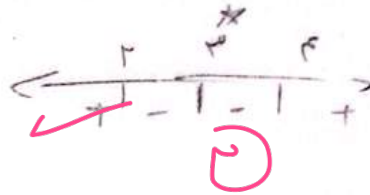
$$\begin{aligned}
 & -x+3 \quad x > 1 \\
 & x^2 \quad -1 \leq x \leq 1 \\
 & -x-1 \quad x \leq -1
 \end{aligned}$$



الف) $y = (x-2)(x-3)(x-4)$



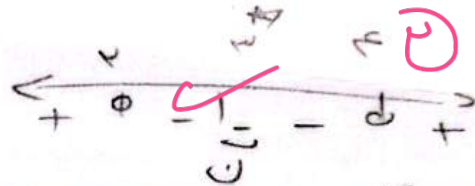
ب) $y = (x-2)(x-3)^2(x-4)$



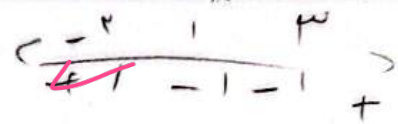
الف) $y = \frac{(x-2)(x-4)}{x-3}$



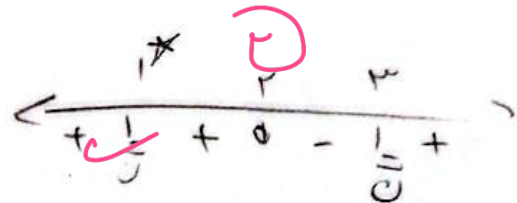
ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$



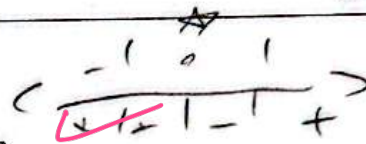
الف) $y = \frac{x^3 - 3x^2 + 2x - 1}{x-3} = \frac{(x-1)(x-2)(x-1)}{x-3}$



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



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



ب) $y = \frac{x^4 + 3x^2 + 2}{x^2 + 2x + 2}$ تعيين علامته؟

(1, 2)

$$\text{ب-۱) } \begin{cases} y_1^3 + y_1 = 3n_1^2 - 1 \\ y_2^3 + y_2 = 3n_2^2 - 1 \end{cases} \xrightarrow{\text{if } n_1 = n_2} y_1^3 + y_1 = y_2^3 + y_2 \rightarrow \underbrace{y_1^3 - y_2^3}_{\text{فیل مضربان}} + (y_1 - y_2) = 0$$

$$(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) \cdot 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$$

$$\downarrow \quad \downarrow \quad \downarrow \quad \downarrow$$

$$y_1 = y_2 \quad \text{!} \quad \text{بحرکت!} \quad y_1 = \frac{-y_2 \pm \sqrt{y_2^2 - 4(y_2^2 + 1)}}{2}$$

$$\text{ب-۱۰) } y = \frac{n^2 + 3n + 2}{n^2 + 2n + 3} \rightarrow \Delta = (3)^2 - 4(2) = 9 - 8 = 1$$

$a = 1 > 0 \rightarrow$ همواره مثبت

$$\Rightarrow \Delta = (2)^2 - 4(3) = 4 - 12 = -8$$

$a = 1 > 0 \rightarrow$ همواره مثبت

عبارت همواره مثبت است!