

الف) $y^3 = 2x^3 - 1 \Rightarrow \begin{cases} y_1^3 - 2x_1^3 + 1 = 0 \\ y_2^3 - 2x_2^3 + 1 = 0 \end{cases} \Rightarrow y_1^3 + 1 = 2x_1^3 = 2x_2^3 = y_2^3 + 1 \Rightarrow y_1 = y_2 \checkmark$

ب) $y^3 + y = 3x^3 - 1 \Rightarrow \begin{cases} y_1^3 + y_1 - 3x_1^3 + 1 = 0 \\ y_2^3 + y_2 - 3x_2^3 + 1 = 0 \end{cases} \Rightarrow y_1^3 + y_1 + 1 = 3x_1^3 = 3x_2^3 = y_2^3 + y_2 + 1$

$y_1^3 + y_1 - y_2^3 - y_2 = 0 \Rightarrow y_1^3 - y_2^3 + y_1 - y_2 = 0$
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + y_1 + y_2) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + y_1 + y_2) = 0 \Rightarrow y_1 = y_2 \checkmark$

الف) $x^2 - 1$ $\checkmark$ $|y| + xy = x^2 + 1 \xrightarrow{x=0} |y| = 1 \Rightarrow y = \pm 1 \times$



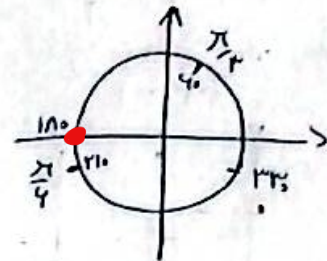
$\checkmark$ $y^3 + x^3 = 2x - 1 \xrightarrow{x=0} y^3 = -1 \Rightarrow y = -1 \checkmark$

$\checkmark$ $\sqrt[3]{y} + \sqrt[3]{x} = 2$
 $\begin{cases} \sqrt[3]{y_1} + \sqrt[3]{x_1} - 2 = 0 \\ \sqrt[3]{y_2} + \sqrt[3]{x_2} - 2 = 0 \end{cases} \Rightarrow \sqrt[3]{y_1} = \sqrt[3]{x_1} = \sqrt[3]{y_2} = \sqrt[3]{x_2} \Rightarrow y_1 = y_2 \checkmark$

الف) $\tan \frac{\pi}{3} = \frac{\sin \frac{\pi}{3}}{\cos \frac{\pi}{3}} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3} \checkmark$

ب) $\cot \frac{\pi}{4} = \frac{\cos \frac{\pi}{4}}{\sin \frac{\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{\frac{\sqrt{2}}{2}} = 1 \checkmark$

ج) $\tan \frac{3\pi}{4} = \frac{\sin \frac{3\pi}{4}}{\cos \frac{3\pi}{4}} = \frac{\frac{\sqrt{2}}{2}}{-\frac{\sqrt{2}}{2}} = -1 \checkmark$

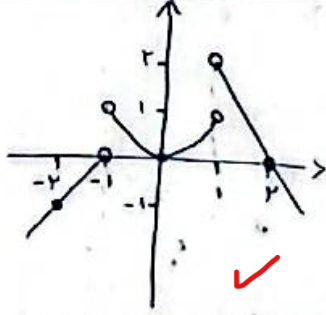


د) $\cot \ln 2 = \text{معرّف نشده}$

الف) $\sin \alpha = \frac{1}{4}$ $D_f = \{\frac{\pi}{4}, \pi - \frac{\pi}{4}\}$

ب) $\cos \alpha = \frac{\sqrt{2}}{2}$ $D_f = \{\frac{\pi}{4}, 2\pi - \frac{\pi}{4}\}$

$f(x) = \begin{cases} -2x+4 & x > 1 \\ x^2 & -1 < x < 1 \\ x+1 & x < -1 \end{cases}$
 $x=1 \rightarrow y=2$
 $x=2 \rightarrow y=0$
 $x=-1 \rightarrow y=1$
 $x=-1 \rightarrow y=1$
 $x=-1 \rightarrow y=0$
 $x=-2 \rightarrow y=-1$



$$f(n) = \begin{cases} -n+3 & n=1 \rightarrow y=2 \\ & n>1 \quad n=2 \rightarrow y=0 \\ & n=1 \rightarrow y=1 \\ -1 < n \leq 1 & n=-1 \rightarrow y=-1 \\ n^3 & \\ n-1 & n \leq -1 \quad n=-1 \rightarrow y=0 \\ & n=-2 \rightarrow y=1 \end{cases}$$

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الف) $(n-r)(n-r)(n-r)$

	r	r	r	r
n-r	-	+	+	+
n-r	-	-	+	+
n-r	-	-	-	+
n-r	-	+	-	+

ب) $y = (n-r)(n-r)(n-r)$

	r	r	r	r
n-r	-	+	+	+
n-r	+	+	+	+
n-r	-	-	-	+
n-r	+	-	-	+

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الف) $y = \frac{(n-r)(n-r)}{(n-r)}$

	r	r	r	r
n-r	-	+	+	+
n-r	-	-	-	+
n-r	-	-	+	+
n-r	-	+	-	+

ب) $y = \frac{(n-r)(n-r)}{(n-r)}$

	r	r	r	r
n-r	-	+	+	+
n-r	-	-	-	+
n-r	+	+	+	+
n-r	+	-	-	+

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

	r	r	r	r
n^2-3n+2	+	-	+	+
n-1	-	-	-	+
n-1	-	+	-	+
n-1	-	+	-	+

با این صفت

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

	r	r	r	r
n^2-3n+2	+	-	+	+
n^2-4n+3	+	-	-	+
n^2-4n+3	+	+	-	+
n^2-4n+3	+	+	-	+

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

	r	r	r	r
n^2-n	-	+	-	+
n^2+n+2	+	+	+	+
n^2+n+2	+	+	+	+
n^2+n+2	+	+	+	+

ب) $\frac{n^2+n}{n^2+n+2} \rightarrow \Delta < 0$

همواره مثبت

	r	r	r	r
n^2+n	+	+	+	+
n^2+n+2	+	+	+	+
n^2+n+2	+	+	+	+
n^2+n+2	+	+	+	+

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ج) $y^3 + x^3 = 2x - 1$

تقریباً ریاضی $\rightarrow \begin{cases} y_1^3 + x_1^3 = 2x_1 - 1 \\ y_2^3 + x_2^3 = 2x_2 - 1 \end{cases} \xrightarrow{x_1 = x_2} \begin{cases} y_1^3 + x^3 = 2x - 1 \\ y_2^3 + x^3 = 2x - 1 \end{cases} \rightarrow y_1^3 = y_2^3 \Rightarrow y_1 = y_2$ تابع است.

الف) $y = \frac{x^3 - 3x + 2}{x - 3}$

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

ریشه ها $\Rightarrow -2$ و 3

