

الف)
$$\left. \begin{aligned} y_1^3 &= 2x_1^2 - 1 \\ y_2^3 &= 2x_2^2 - 1 \end{aligned} \right\} \xrightarrow{x_1=x_2} y_1^3 = y_2^3 \Rightarrow y_1 = y_2$$

ب)
$$\left. \begin{aligned} y_1^3 + y_1 &= 3x_1^2 - 1 \\ y_2^3 + y_2 &= 3x_2^2 - 1 \end{aligned} \right\} \xrightarrow{x_1=x_2} y_1^3 + y_1 = y_2^3 + y_2$$

$\Rightarrow y_1^3 - y_2^3 + y_1 - y_2 = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$

$\Rightarrow y_1 - y_2 = 0 \Rightarrow y_1 = y_2$

$y_1^2 + y_1 y_2 + y_2^2 + 1 = 0 \Rightarrow \Delta < 0$

هردو معادله بی‌حلول است

الف) $y = x^2 - 1$

ب) $|y| + xy = x^2 + 1 \xrightarrow{x=y} |y| = 1 \Rightarrow y = \pm 1$

ج)
$$\left. \begin{aligned} y_1^3 + x_1^3 &= 2x_1 - 1 \\ y_2^3 + x_2^3 &= 2x_2 - 1 \end{aligned} \right\} \xrightarrow{x_1=x_2} y_1^3 = y_2^3 \Rightarrow y_1 = y_2$$

د) $\sqrt[3]{y_1} + \sqrt[3]{x_1} = 2$

ه) $\sqrt[3]{y_2} + \sqrt[3]{x_2} = 2$

$\xrightarrow{x_1=x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$

الف) $\tan \frac{\pi}{6} = \frac{\sin \frac{\pi}{6}}{\cos \frac{\pi}{6}} = \frac{\frac{1}{2}}{\frac{\sqrt{3}}{2}} = \frac{1}{\sqrt{3}}$

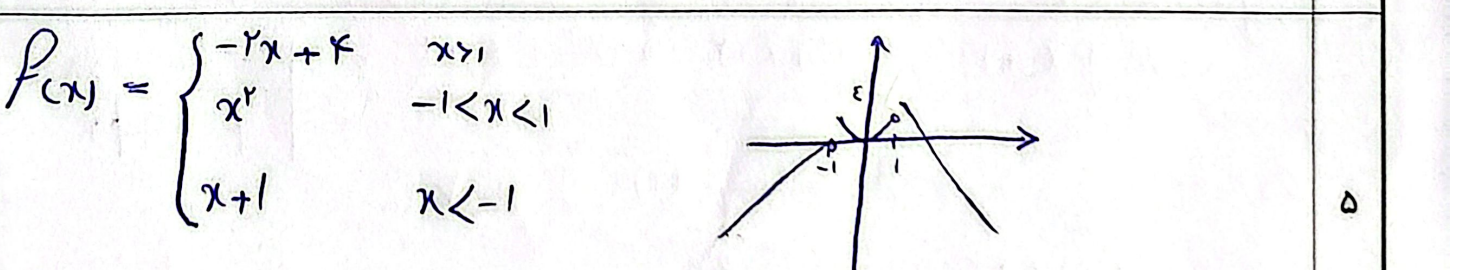
ب) $\cot \frac{\pi}{6} = \frac{\cos \frac{\pi}{6}}{\sin \frac{\pi}{6}} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$

ج) $\tan \frac{5\pi}{6} = \frac{\sin \frac{5\pi}{6}}{\cos \frac{5\pi}{6}} = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}}$

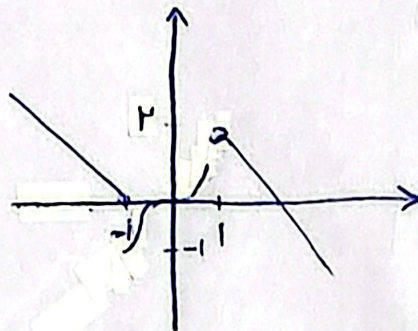
د) $\cot \frac{5\pi}{6} = \frac{\cos \frac{5\pi}{6}}{\sin \frac{5\pi}{6}} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

الف) $\sin \alpha = \frac{1}{2} \Rightarrow \alpha = \begin{cases} \frac{\pi}{6} \\ \frac{5\pi}{6} \end{cases}$

ب) $\cos \alpha = \frac{\sqrt{2}}{2} \Rightarrow \alpha = \begin{cases} \frac{\pi}{4} \\ \frac{7\pi}{4} \end{cases}$



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



الف) $y = (x-2)(x-3)(x-4)$

	2	3	4
	-	+	-
	+	-	+

ب) $y = (x-2)(x-3)^2(x-4)$

	2	3	4
	+	-	-
	-	+	+

الف) $y = \frac{(x-2)(x-4)}{x-3}$

	2	3	4
	-	+	-
	+	-	+

ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$

	2	3	4
	+	-	-
	-	+	+

$$\begin{array}{r} x^3 - 2x^2 + 4x - 8 \mid x-3 \\ -x^3 + 3x^2 - 4x + 12 \\ \hline 5x^2 - 4x + 12 \end{array}$$

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الف) $y = \frac{x^3 - 3x^2 + 2}{x^2 - 5x + 3} = \frac{(x+2)(x-1)^2}{x-3}$

	-2	1	3
	+	-	-
	-	+	+

اینجا قسمتی

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ب) $y = \frac{x^3 - 3x^2 + 2}{x^2 - 5x + 3} = \frac{(x-1)(x+2)}{(x-3)(x-1)}$

	1	2	3
	+	+	-
	-	-	+

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

	-1	0	1
	-	+	-
	+	-	+

قسمت مثبت

$\Delta < 0$

$\Delta = 9 - 4(1)(2) = -7$

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ب) $y = \frac{x^2 + 3x + 2}{x^2 + 2x + 3}$ این عبارت همواره مثبت

	$-\infty$	$+\infty$
	+	

$\Delta = 9 - 4(1)(3) = -7$

قسمت مثبت