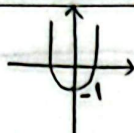


الف) $y_1^3 = 2x_1^2 - 1$
 $y_2^3 = 2x_2^2 - 1$ $\xrightarrow{x_1=x_2}$ $y_1^3 = y_2^3 \Rightarrow y_1 = y_2$
 تابع است

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ب) $y^3 + y = 3x^2 - 1 \Rightarrow y_1^3 + y_1 = 3x_1^2 - 1$
 $y_2^3 + y_2 = 3x_2^2 - 1$ $\xrightarrow{x_1=x_2}$ $y_1^3 + y_1 = y_2^3 + y_2 \Rightarrow y_1 = y_2$
 تابع است

الف) $y = x^2 - 1$
 تابع است



ج) $y^3 + x^3 = 2x - 1$
 $y_1^3 + x_1^3 = 2x_1 - 1$
 $y_2^3 + x_2^3 = 2x_2 - 1$ $\xrightarrow{x_1=x_2}$ $y_1^3 = y_2^3 \Rightarrow y_1 = y_2$
 تابع است

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ب) $|y| + xy = x^2 + 1$
 $|y_1| + x_1 y_1 = x_1^2 + 1$
 $|y_2| + x_2 y_2 = x_2^2 + 1$ $\xrightarrow{x_1=x_2}$ $|y_1| = |y_2|$
 $\pm y_1 = \pm y_2$

د) $\sqrt[3]{y} + \sqrt[3]{x} = 2$
 $\sqrt[3]{y_1} + \sqrt[3]{x_1} = 2$
 $\sqrt[3]{y_2} + \sqrt[3]{x_2} = 2$ $\xrightarrow{x_1=x_2}$ $\sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$
 تابع است

الف) $\frac{\sin 90^\circ}{\cos 90^\circ} = \frac{\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = -\sqrt{3}$

د) $\cot 110^\circ \Rightarrow$ تعریف نشده

ب) $\frac{\cos 110^\circ}{\sin 110^\circ} = \frac{-\frac{\sqrt{3}}{2}}{\frac{1}{2}} = -\sqrt{3}$

۳

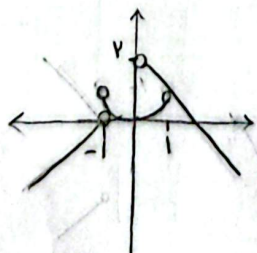
ج) $\frac{\sin 330^\circ}{\cos 330^\circ} = \frac{-\frac{1}{2}}{\frac{\sqrt{3}}{2}} = -\frac{1}{\sqrt{3}}$

الف) $\sin a = \frac{1}{\sqrt{2}}$ $a: \{\frac{\pi}{4}, \frac{3\pi}{4}\}$

ب) $\cos a = \frac{\sqrt{2}}{2}$ $a: \{\frac{\pi}{4}, \frac{7\pi}{4}\}$

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

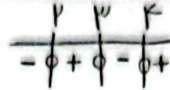


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$$f(x) = \begin{cases} -x^2 + 3 & x > 1 \\ x^3 & -1 \leq x \leq 1 \\ -x - 1 & x < -1 \end{cases}$$



الف) $y = (x-2)(x-3)(x-4)$



$$D_f = \mathbb{R}$$

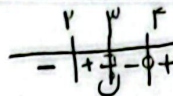
ب) $y = (x-2)(x-3)^2(x-4)$

$$x-3 \neq 0 \Rightarrow x \neq 3$$

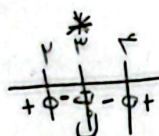


الف) $\frac{(x-2)(x-4)}{x-3} \Rightarrow$

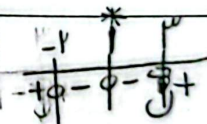
$$x-3 \neq 0 \Rightarrow x \neq 3$$



ب) $\frac{(x-2)(x-4)}{(x-3)^2}$



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



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



الف) $\frac{x^2 - x}{x^2 + x + 1} = \frac{(x^2 - x)(x^2 + x)}{x^2 + x + 1} \rightarrow 1, 0, -1$



ب) $\frac{x^2 + 3x + 4}{x^2 + 2x + 3} \rightarrow \Delta < 0$

$$\Delta = 9 - 16 = -7 < 0$$

