

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

ب) $y^3 - y = 2x^2 - 1 \Rightarrow \begin{cases} y_1^3 + y_1 = 2x_1^2 - 1 \\ y_2^3 + y_2 = 2x_2^2 - 1 \end{cases} \Rightarrow y_1^3 + y_1 = y_2^3 + y_2 \Rightarrow y_1^3 - y_2^3 + y_1 - y_2 = 0$
 $(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0 \Rightarrow y_1 = y_2$ تابع است

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

د) $|y| + xy = x^2 + 1 \Rightarrow x = 0 \Rightarrow |y| = 1 \Rightarrow y = \pm 1$ تابع نیست

ه) $y^3 + x^3 = 2x - 1 \Rightarrow x = 0 \Rightarrow y^3 = -1 \Rightarrow y = -1$ تابع است

و) $\sqrt[3]{y} + \sqrt[3]{x} = x \Rightarrow (\sqrt[3]{y} + \sqrt[3]{x+2})^3 \Rightarrow x = 8 \Rightarrow y = 0 \Rightarrow$ تابع است

الف) $\tan \frac{\pi}{4} = \frac{\sin \frac{\pi}{4}}{\cos \frac{\pi}{4}} \Rightarrow \frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}} = 1$

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

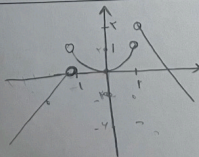
ج) $\tan 45^\circ = \frac{\sin 45^\circ}{\cos 45^\circ} = \frac{\frac{1}{\sqrt{2}}}{\frac{1}{\sqrt{2}}} = 1$

د) $\cot 180^\circ = \frac{-1}{0} \rightarrow 0$

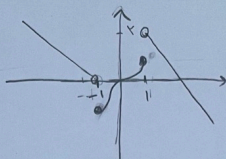
الف) $\sin a = \frac{1}{\sqrt{2}} \Rightarrow a = \begin{cases} 45^\circ \\ 135^\circ \end{cases} \Rightarrow a = \begin{cases} \frac{\pi}{4} \\ \frac{3\pi}{4} \end{cases}$

ب) $\cos a = \frac{\sqrt{2}}{2} \Rightarrow a = \begin{cases} 45^\circ \\ 315^\circ \end{cases} \Rightarrow a = \begin{cases} \frac{\pi}{4} \\ \frac{7\pi}{4} \end{cases}$

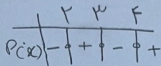
$f(x) = \begin{cases} -x+1 & x > 1 \\ x^2 & -1 < x < 1 \\ x+1 & x < -1 \end{cases}$



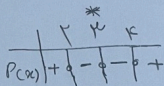
$$f(x) = \begin{cases} -x+4 & x > 1 \\ x^3 & 1 \leq x \leq 1 \\ -x-1 & x < -1 \end{cases}$$



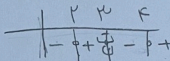
الف) $y = (x-2)(x-3)(x-4)$



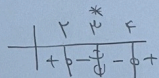
ب) $y = (x-2)(x-3)(x-4)$



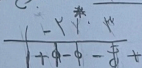
الف) $y = \frac{(x-2)(x-4)}{x-3}$



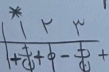
ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$



الف) $y = \frac{x^3 - 3x + 2}{x-3} \Rightarrow 0 = \text{مقام} \Rightarrow (x-1)(x^2 + x - 2)$



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



الف) $\frac{x^3 - x^2}{x^3 + x + 2} = \frac{x^2(x-1)}{x^3 + x + 2} \Rightarrow \frac{x^2(x-1)(x+1)}{x^3 + x + 2} = \frac{-1 \ 0 \ 1}{- \ + \ - \ +}$

ب) $\frac{x^3 + 3x + 2}{x^3 + 2x + 2} = \frac{\Delta x_0}{\Delta x_0} \Rightarrow \frac{0}{0}$