

$$الف) y^3 = 2x^2 - 1$$

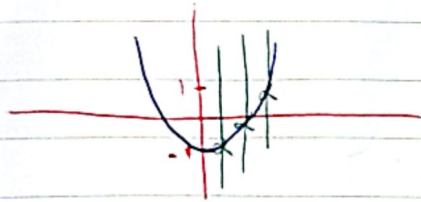
$$\begin{cases} y_1^3 = 2x_1^2 - 1 \\ y_2^3 = 2x_2^2 - 1 \end{cases} \xrightarrow{x_1 = x_2} y_1 = y_2 \Rightarrow \text{تابع هست} \checkmark$$

$$ب) y^3 + y = 3x^2 - 1$$

$$\begin{cases} y_1^3 + y_1 = 3x_1^2 - 1 \\ y_2^3 + y_2 = 3x_2^2 - 1 \end{cases} \xrightarrow{x_1 = x_2} y_1 = y_2 \Rightarrow \text{تابع هست} \checkmark$$

دایره صفت ادامه!

$$ج) y = x^2 - 1$$



$\Rightarrow$ تابع هست

$$د) |y| + xy = x^2 + 1$$

$$x=0 \Rightarrow |y| = 1 \Rightarrow \begin{cases} y=1 \\ y=-1 \end{cases} \Rightarrow \text{تابع نیست}$$

$$ه) y^3 + x^3 = 2x - 1$$

$$\begin{cases} y_1^3 = 2x_1 - x_1^3 - 1 \\ y_2^3 = 2x_2 - x_2^3 - 1 \end{cases} \xrightarrow{x_1 = x_2} y_1^3 = y_2^3 \Rightarrow y_1 = y_2 \Rightarrow \text{تابع هست}$$

$$و) \sqrt[3]{y} + \sqrt[3]{x} = 2 \Rightarrow \sqrt[3]{y} = 2 - \sqrt[3]{x} \Rightarrow \text{تابع هست}$$

به ازای هر x، یک عدد y داریم

$$1) \tan \frac{\sqrt{3}}{4} \rightarrow \frac{\sin 40^\circ}{\cos 40^\circ} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3} \quad \checkmark$$

(ق)

(2)

$$\rightarrow \cot \frac{\sqrt{3}}{4} \rightarrow \frac{\cos 40^\circ}{\sin 40^\circ} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = +\sqrt{3} \quad \checkmark$$

$$2) \tan 44^\circ \rightarrow \frac{\sin 44^\circ}{\cos 44^\circ} = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}} = -\frac{\sqrt{3}}{4} \quad \checkmark$$

$$3) \cot 110^\circ \rightarrow \frac{\cos 110^\circ}{\sin 110^\circ} = \frac{-1}{0} \Rightarrow \text{غير معرف} \quad \checkmark$$

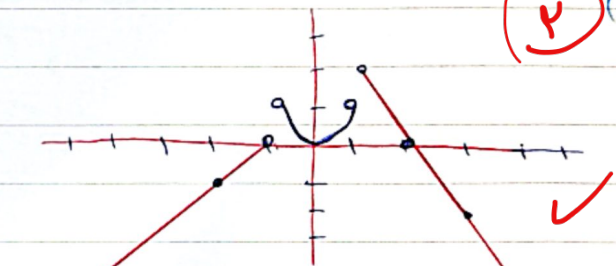
(ق)

(3)

$$1) \sin \alpha = \frac{1}{2} \Rightarrow 30^\circ, 150^\circ \rightarrow \frac{\sqrt{3}}{4}, \frac{5\sqrt{3}}{4} \quad \checkmark$$

$$\rightarrow \cos \alpha = \frac{\sqrt{3}}{2} \Rightarrow 30^\circ, 330^\circ \rightarrow \frac{\sqrt{3}}{4}, \frac{5\sqrt{3}}{4} \quad \checkmark$$

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

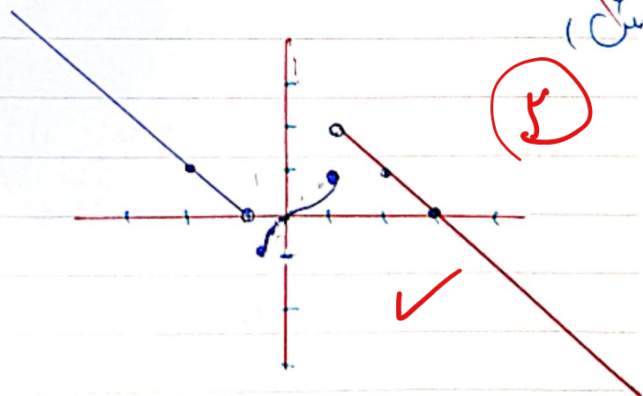


(2) (ق)

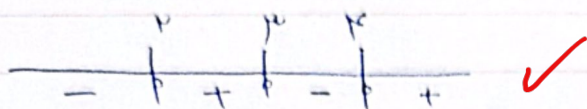
(ق)

(3)

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

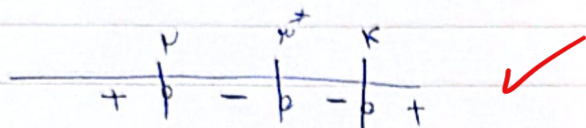


الف) $y = (x-2)(x-3)(x-4) =$

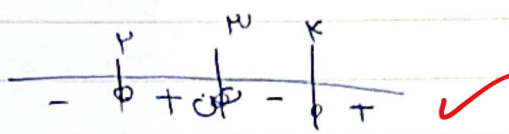


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ب) $y = (x-2)(x-3)(x-4)(x-5) =$

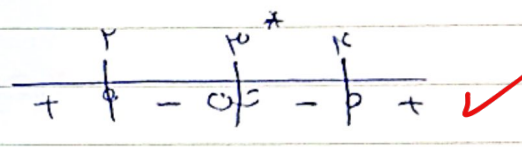


الف) $y = \frac{(x-2)(x-3)}{x-4} \Rightarrow$

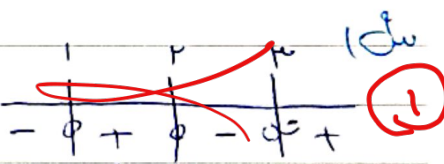


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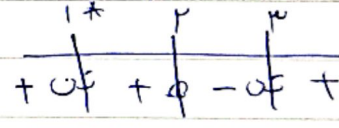
ب) $y = \frac{(x-2)(x-3)}{(x-4)(x-5)} \Rightarrow$



~~الف) $y = \frac{x^2 - 3x + 2}{x-4} = \frac{(x-1)(x-2)}{x-4} \Rightarrow$~~

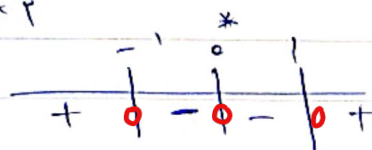


$y = \frac{x^2 - 3x + 2}{x^2 - 4x + 3} = \frac{(x-1)(x-2)}{(x-1)(x-3)} \Rightarrow$



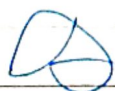
الف) $y = \frac{x^2 - x}{x^2 + x + 2} = \frac{x(x-1)}{x^2 + x + 2}$

Δ منفی است پس ریشه ندارد



۱, ۲

ب) $\frac{x^2 + 3x + 2}{x^2 + 2x + 3} = \frac{x^2 + 3x + 2}{x^2 + 2x + 3}$ Δ منفی است $\Rightarrow$ ریشه ندارد



cn

هواره مثبت $\Rightarrow (3)^2 - 4(1)(4) = -7 < 0$

هواره مثبت $\Rightarrow (2)^2 - 4(1)(3) = -8 < 0$

عبارت هواره مثبت است

(۱)

جواب $y^3 + y = 3x^2 - 1$

$$\begin{cases} y_1^3 + y_1 = 3x_1^2 - 1 \\ y_2^3 + y_2 = 3x_2^2 - 1 \end{cases} \xrightarrow{x_1 = x_2} \begin{cases} y_1^3 + y_1 = 3x_1^2 - 1 \\ y_2^3 + y_2 = 3x_1^2 - 1 \end{cases} \rightarrow y_1^3 + y_1 = y_2^3 + y_2$$

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

اگر $y_1 = y_2$ برقرار است اول صفر باشد

جواب ندارد. $\Delta = y_2^2 - 4(1)(y_2^2 + 1) \rightarrow \Delta = -3y_2^2 - 4 \rightarrow \Delta < 0$ معادله حقیقی

بنابراین برقرار اول صفر است. $\Leftarrow$ تابع است.

(۲)

$\sqrt[3]{y} + \sqrt[3]{x} = 2$

تعریف ریاضی $\rightarrow \begin{cases} \sqrt[3]{y_1} + \sqrt[3]{x_1} = 2 \\ \sqrt[3]{y_2} + \sqrt[3]{x_2} = 2 \end{cases} \xrightarrow{x_1 = x_2} \begin{cases} \sqrt[3]{y_1} + \sqrt[3]{x} = 2 \\ \sqrt[3]{y_2} + \sqrt[3]{x} = 2 \end{cases} \rightarrow \sqrt[3]{y_1} = \sqrt[3]{y_2} \Rightarrow y_1 = y_2$ تابع است.

الف) $y = \frac{x^3 - 3x + 2}{x - 3}$

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

$\xrightarrow{-2}$
 $\hookrightarrow 3$

ریشه ها $\Rightarrow -2, 3$

