

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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الف) $y_1^3 + y_1 = 2x_1^2 - 1$
 $y_2^3 + y_2 = 2x_2^2 - 1$ $\xrightarrow{x_1=x_2} y_1^3 + y_1 = y_2^3 + y_2 \rightarrow y_1^3 - y_2^3 + y_1 - y_2 = 0$
 $\rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$

محدود

الف) $y_1 = x_1^2 - 1$
 $y_2 = x_2^2 - 1$ $\xrightarrow{x_1=x_2} y_1 = y_2$ تابع است
 $\sqrt[3]{y_1} = \sqrt[3]{x_1^2 - 1}$
 $\sqrt[3]{y_2} = \sqrt[3]{x_2^2 - 1}$ $\xrightarrow{x_1=x_2} \sqrt[3]{y_1} = \sqrt[3]{y_2} \rightarrow y_1 = y_2$ تابع است

الف) $|y| + xy = x^2 + 1$ $\xrightarrow{x=0} |y| = 1 \rightarrow \begin{cases} y=1 \\ y=-1 \end{cases}$ تابع نیست

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

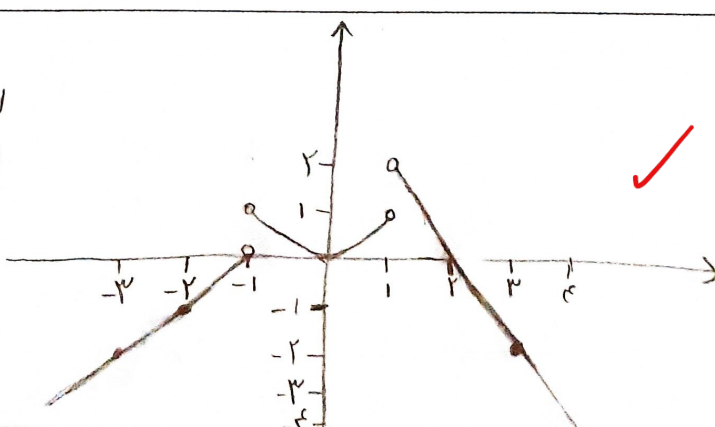
$\cot \frac{\sqrt{3}\pi}{4} 110^\circ$ $\cot t = \frac{\cos}{\sin} =$ (ب) $\tan \frac{\pi}{4} 40^\circ$ $\tan = \frac{\sin}{\cos} =$ (ف)
 $\frac{\frac{\sqrt{3}}{4}}{-\frac{1}{4}} = \sqrt{3}$ $\frac{\frac{\sqrt{3}}{4}}{\frac{1}{4}} = \sqrt{3}$

$\cot 110^\circ$ $\cot t = \frac{\cos}{\sin} =$ (ب) $\tan 330^\circ$ $\tan = \frac{\sin}{\cos} =$ (ج)
 $\frac{-1}{0} = \text{تعریف نشده}$ $\frac{-\frac{1}{4}}{\frac{\sqrt{3}}{4}} = -\frac{1}{\sqrt{3}}$

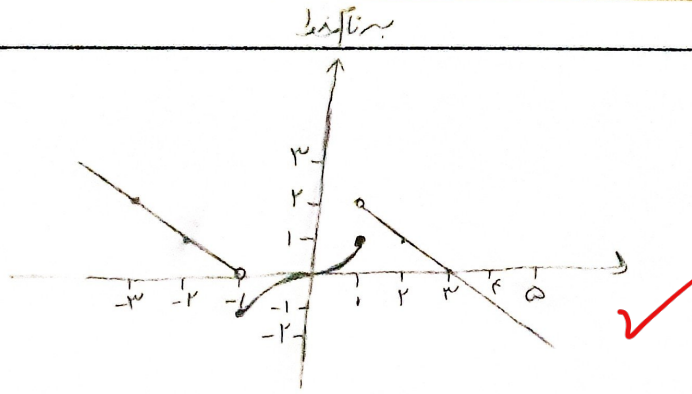
الف) $\sin \alpha = \frac{1}{4} \rightarrow \begin{cases} \alpha = 30^\circ \\ \alpha = 150^\circ \end{cases} \rightarrow \begin{cases} \alpha = \frac{\pi}{6} \\ \alpha = \frac{5\pi}{6} \end{cases}$

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

$f(x) = \begin{cases} -2x+5 & x > 1 \\ x^2 & -1 < x < 1 \\ x+1 & x < -1 \end{cases}$



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



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الف) $y = (x-2)(x-3)(x-4)$

$$\begin{array}{cccc} & 2 & 3 & 4 \\ & \downarrow & \downarrow & \downarrow \\ - & \phi & + & \phi - \phi + \end{array}$$

✓

ب) $y = (x-2)(x-3)^2(x-4)$

$$\begin{array}{cccc} & 2 & 3^* & 4 \\ & \downarrow & \downarrow & \downarrow \\ + & \phi & - & \phi - \phi + \end{array}$$

✓

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

$$\begin{array}{cccc} & 2 & 3 & 4 \\ & \downarrow & \downarrow & \downarrow \\ - & \phi & + & \phi - \phi + \end{array}$$

✓

ب) $\frac{(x-2)(x-4)}{(x-3)^2}$

$$\begin{array}{cccc} & 2 & 3^* & 4 \\ & \downarrow & \downarrow & \downarrow \\ + & \phi & - & \phi - \phi + \end{array}$$

✓

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

$$\begin{array}{cccc} & 1 & 2 & 3 \\ & \downarrow & \downarrow & \downarrow \\ - & \phi & + & \phi - \phi + \end{array}$$

باس منفی

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

$$\begin{array}{cccc} & 1^* & 2 & 3 \\ & \downarrow & \downarrow & \downarrow \\ + & \phi & + & \phi - \phi + \end{array}$$

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

$$\begin{array}{cccc} & -1 & 0^* & 1 \\ & \downarrow & \downarrow & \downarrow \\ + & \phi & - & \phi - \phi + \end{array}$$

✓

$\Delta = 1-4 \rightarrow \Delta < 0$
دو ریشه ندارد

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✓ $y = \frac{x^2+3x+4}{x^2+2x+3} \rightarrow \Delta = 9-16 \rightarrow \Delta < 0$ و ریشه ندارد
 $x^2+2x+3 \rightarrow \Delta = 4-12 \rightarrow \Delta < 0$ و ریشه ندارد
مشتاب است

الف) $y = \frac{x^3 - 3x + 2}{x - 3}$

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

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

3 و -2 ریشه ها

