

۱- تابع است $\begin{cases} y_1^3 = 2m_1^2 - 1 \\ y_2^3 = 2m_2^2 - 1 \end{cases} \xrightarrow{m_1 = m_2} y_1^3 = y_2^3$ الف) $y^3 = 2m^2 - 1$

ب) $y^3 + y = 2m^2 - 1$ $\begin{cases} y_1^3 + y_1 = 2m_1^2 - 1 \\ y_2^3 + y_2 = 2m_2^2 - 1 \end{cases} \xrightarrow{m_1 = m_2} y_1^3 + y_1 = y_2^3 + y_2$
 $y_1^3 + y_1 - y_2^3 - y_2 = 0$

$(y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2) + (y_1 - y_2) = 0 \rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$
 $\rightarrow y_1 = y_2$ $y_1 = \frac{-y_2 \pm \sqrt{3y_2^2 - 4}}{2} \rightarrow \Delta < 0$ تابع است

۲- تابع است $y = m^2 - 1 \xrightarrow{\text{مثال نقیض}} m = 2 \rightarrow y = 4 - 1 = 3$ الف) $y = m^2 - 1$

ب) $|y| + ny = m^2 + 1 \rightarrow y(n+1) = m^2 + 1$ $\begin{cases} y < 0 \\ y \geq 0 \end{cases} \begin{cases} y = \frac{m^2 + 1}{n+1} \\ y = \frac{m^2 + 1}{n-1} \end{cases}$
 $y = \pm 1$ تابع نیست
 اگر $m = 0 \rightarrow y = 1$

۲.) $y^3 = 2m - 1 = m^3$ $y = \sqrt[3]{2m-1-m^3}$ $\rightarrow$ فقط یک حقا برای هر m واقعی تابع است

۳) $\sqrt[3]{y} + \sqrt[3]{m} = 2$ $\sqrt[3]{y} = 2 - \sqrt[3]{m} \rightarrow y = (2 - \sqrt[3]{m})^3$ $\rightarrow$ به ازای هر m یک y داریم سه تابع است

۳- الف) $\tan\left(\frac{\pi}{3}\right) \rightarrow$ زاویه $60^\circ \rightarrow \tan 60^\circ = \sqrt{3}$

ب) $\cot\left(\frac{\sqrt{3}\pi}{4}\right) \rightarrow$ زاویه $45^\circ \rightarrow \cot 45^\circ = \sqrt{3}$

۲.) $\tan\left(\frac{\pi}{3}\right) \rightarrow$ زاویه $60^\circ \rightarrow \tan 60^\circ = \sqrt{3}$

جواب ندارد $\Rightarrow$ تعریف نشده $\rightarrow \cot 110 \rightarrow \frac{\cos}{\sin} = \frac{-1}{0}$

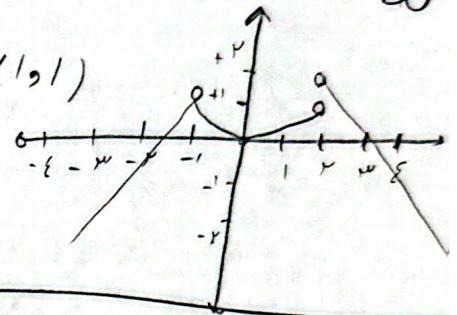
الف) $\sin \alpha = \frac{1}{r}$

$\rightarrow 30^\circ, 150^\circ = \alpha = \frac{\pi}{6}, \frac{5\pi}{6}$

ب) $\cos \alpha = \frac{\sqrt{2}}{r}$

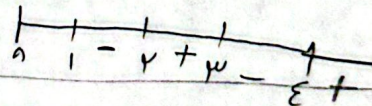
$\rightarrow 45^\circ, 315^\circ = \alpha = \frac{\pi}{4}, \frac{7\pi}{4}$

الف) $f(n) = \begin{cases} -2n+4 & n > 1 \rightarrow (1, 2) \\ n^2 & -1 < n < 1 \rightarrow (-1, 1) \\ n+1 & n < -1 \rightarrow (-1, 0) \end{cases}$

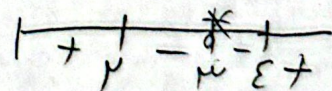


$f(n) = \begin{cases} -n+3 & n > 1 \rightarrow (1, 2) \\ n^2 & -1 \leq n \leq 1 \rightarrow (-1, 1) \\ -n-1 & n < -1 \rightarrow (-1, 0) \end{cases}$

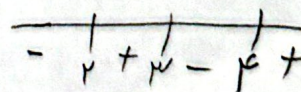
الف) $y = (n-2)(n-3)(n-4) \rightarrow$ ریشه ها $= n=2, n=3, n=4$



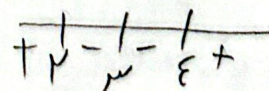
ب) $y = (n-2)(n-3)^2(n-4) \rightarrow n=2, 3, 4$



الف) $y \geq \frac{(n-2)(n-4)}{n-3} \rightarrow$
 $n-3 \geq 0 \rightarrow n \geq 3$



ب) $y \geq \frac{(n-2)(n-4)}{(n-3)^2} \rightarrow$ همیشه مثبت



الف) $y = \frac{n^3 - 3n + 2}{n - 3} \rightarrow (n-1)^2(n+2) \rightarrow$ ریشه ها $n = -2, 1, 3$ -9

$$\begin{array}{c} + \quad - \quad + \\ \hline + \quad - \quad 2 \quad - \quad 1 \quad - \quad 3 \quad + \end{array}$$

ب) $y = \frac{n^2 - 3n + 2}{n^2 - 6n + 9} \rightarrow \frac{(n-1)(n-2)}{(n-3)^2} \Rightarrow n = 1, 2, 3$

$$\begin{array}{c} + \quad - \quad + \quad - \quad + \\ \hline 1 \quad 2 \quad 3 \end{array}$$

الف) $y = \frac{n^2 - n^4}{n^2 + n + 2} \rightarrow n^2(n^2 - 1) \rightarrow n = 0, 1$ -1

$$\begin{array}{c} + \quad - \quad + \\ \hline + \quad 0 \quad - \quad 1 \quad + \end{array}$$

ب) $y = \frac{n^4 + 3n + 6}{n^2 + 2n + 3}$