

الف) $y^3 = 2x^2 - 1$ $\begin{cases} y_1^3 = 2x_1^2 - 1 \\ y_2^3 = 2x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} y_1 = y_2$ $y = \sqrt[3]{2x^2 - 1}$

ب) $y^3 + y = 2x^2 - 1$ $\begin{cases} y_1^3 + y_1 = 2x_1^2 - 1 \\ y_2^3 + y_2 = 2x_2^2 - 1 \end{cases} \xrightarrow{x_1=x_2} y_1 + y_1 = y_2 + y_2$

کتور: $(y_1^3 - y_2^3) + (y_1 - y_2) = 0 \Rightarrow (y_1 - y_2)(y_1^2 + y_1 y_2 + y_2^2 + 1) = 0$
 صفر نمی شود $\Rightarrow y_1 = y_2$ تابع است ✓

الف) $y = x^2 - 1$ $\rightarrow x = 0 \rightarrow y = -1$ ب) $1y + 1x = x^2 - 1 \rightarrow 1x = x^2 - 1 - 1y \rightarrow y = \pm(x^2 - 1 - 1x)$

ج) $y^3 + x^3 = 2x - 1$ $\rightarrow y = \sqrt[3]{2x - 1 - x^3}$ باید همبندی برای x و y داشته باشیم
 د) $\sqrt{y} + \sqrt{x} = 2$ $\rightarrow \sqrt{y} = 2 - \sqrt{x} \rightarrow y = (2 - \sqrt{x})^2$ تابع است ✓

الف) $\tan \frac{\pi}{3} = \tan 60^\circ = \frac{54}{61}$ $\frac{\sqrt{3}}{1} = \sqrt{3}$

ب) $\cot \frac{\sqrt{\pi}}{y} = \cot 21^\circ = \frac{C_{21}}{S_{21}} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \sqrt{3}$

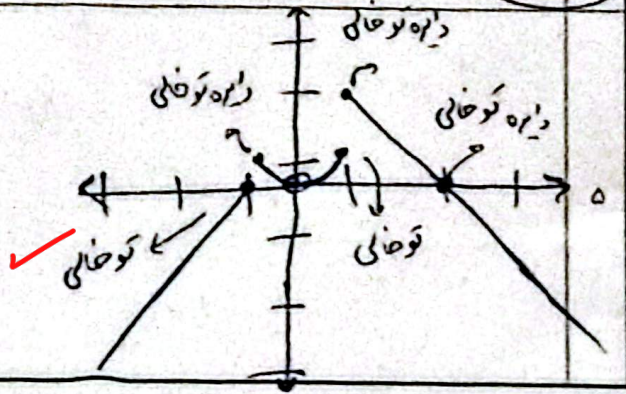
ج) $\tan 33^\circ = \frac{-\frac{1}{\sqrt{3}}}{\frac{1}{2}} = -\frac{1}{\sqrt{3}}$ کیرنوسه

د) $\cot 18^\circ = \frac{1}{0}$

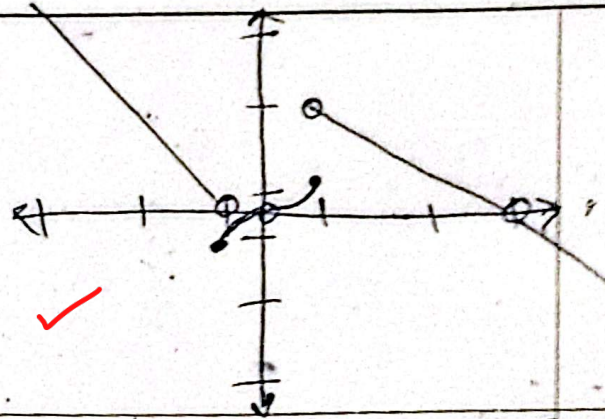
الف) $\sin \alpha = \frac{1}{2}$ $\alpha = 30^\circ, 150^\circ \Rightarrow \frac{\pi}{6}, \frac{5\pi}{6}$ $2k\pi + \frac{\pi}{6}, 2k\pi + \frac{5\pi}{6}$

ب) $\cos \alpha = \frac{\sqrt{2}}{2}$ $\Rightarrow \alpha = 45^\circ, 315^\circ \Rightarrow \frac{\pi}{4}, \frac{7\pi}{4}$ $2k\pi + \frac{\pi}{4}, 2k\pi + \frac{7\pi}{4}$

$f(x) = \begin{cases} 2x+6 & x > 1 \\ x^2 & -1 < x < 1 \\ x+1 & x < -1 \end{cases}$



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



الف) $y = (x-2)(x-3)(x-4)$

ریشه ها: $x=2, x=3, x=4$

ب) $\frac{y}{x} = \frac{x^3}{-x^3 + 6x^2 - 11x + 8}$

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ب) $y = (x-2)^2(x-3)^2(x-4)$ $x=2, x=3, x=4$

$\frac{y}{x} = \frac{x^5}{x^5 - 14x^4 + 52x^3 - 72x^2 + 48x - 16}$

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الف) $\frac{(x-2)(x-4)}{x-3}$

ریشه ها: $x=2, x=4, x=3$

$\frac{y}{x} = \frac{x^3}{-x^3 + 6x^2 - 11x + 8}$

~~.....~~

ب) $\frac{(x-2)(x-4)}{(x-3)^2}$

ریشه ها: $x=2, x=4, x=3, x=3$

$\frac{y}{x} = \frac{x^4}{x^5 - 10x^4 + 27x^3 - 26x^2 + 12x - 8}$

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

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

$\frac{-x^3 + 2x^2 + 3x - 2}{x-2}$

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

ریشه ها: $x=1, x=2, x=3, x=3$

$\frac{x^3}{x^4 - 6x^3 + 11x^2 - 6x + 1}$

الف) $\frac{x^4 - x^2}{x^2 + x + 2}$

$x^2(x^2 - 1) \rightarrow x^2(x-1)(x+1)$

$\frac{-x^4 + x^2}{x^3 - x^2 - 2x + 2}$

ب) $\frac{x^2 + 3x + 2}{x^2 + 2x + 3}$

$(-x+2)(x+1)$