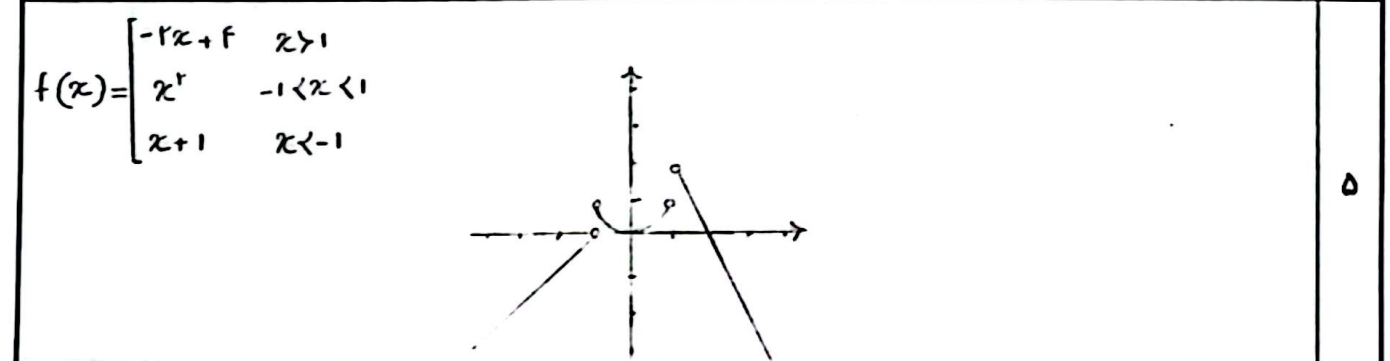


تابع است $y^r = 1x^r - 1 \rightarrow y_1^r = 1x_1^r - 1, x_1 = x_r \rightarrow y_1^r = y_r^r \rightarrow y_1 = y_r$
 (الف) $y^r = 1x^r - 1$
 (ب) $y^r + y = 1x^r - 1 \rightarrow y_1^r + y_1 = 1x_1^r - 1, x_1 = x_r \rightarrow y_1^r + y_1 = y_r^r + y_r \rightarrow y_1^r - y_r^r + y_1 - y_r = 0$
 $y_1^r + y_1 = 1x_1^r - 1 \quad (y_1 - y_r)(y_1^r + y_1 y_r + y_r^r + 1) = 0$
 $(y_1 - y_r)(y_1^r + y_1 y_r + y_r^r + 1) = 0$
 $y_1 - y_r = 0 \rightarrow y_1 = y_r$ و $y_1^r + y_1 y_r + y_r^r + 1 = 0 \xrightarrow{a=1, b=y^r, c=y^r+1} \Delta = b^2 - 4ac \rightarrow y^r - 4(y^r+1) = -3y^r - 4$
 همیشه منفرد زیرا $\Delta < 0$ تابع است

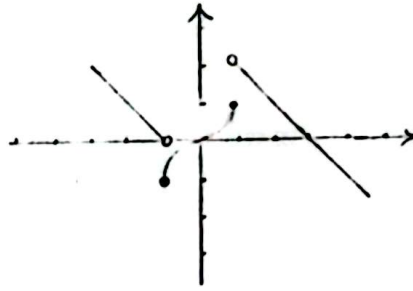
تابع است $y = x^r - 1 \rightarrow y_1 = x_1^r - 1, x_1 = x_r \rightarrow y_1 = y_r$
 (الف) $y = x^r - 1$
 (ب) $|y| + xy = x^r + 1 \xrightarrow{x=0} |y| = 1 \rightarrow y = \pm 1$ تابع نیست
 (ج) $y^r + x^r = 1x - 1 \rightarrow y_1^r + x_1^r = 1x_1 - 1, x_1 = x_r \rightarrow y_1^r = y_r^r \rightarrow y_1 = y_r$ تابع است
 $y_1^r + x_1^r = 1x_1 - 1$
 (د) $\sqrt[3]{y} + \sqrt[3]{x} = 1 \rightarrow \sqrt[3]{y_1} + \sqrt[3]{x_1} = 1, x_1 = x_r \rightarrow \sqrt[3]{y_1} = \sqrt[3]{y_r} \rightarrow y_1 = y_r$ تابع است
 $\sqrt[3]{y_1} + \sqrt[3]{x_1} = 1$

(الف) $\tan \frac{\pi}{3} = \frac{\frac{\sqrt{3}}{2}}{\frac{1}{2}} = \sqrt{3}$
 (ب) $\cot \frac{\sqrt{2}}{6} = \frac{-\frac{\sqrt{3}}{2}}{-\frac{1}{2}} = \sqrt{3}$
 (ج) $\tan 330^\circ = \frac{-1}{\frac{\sqrt{3}}{2}} = \frac{-1}{\sqrt{3}} = \frac{-\sqrt{3}}{3}$
 (د) $\cot 110^\circ = \frac{-1}{0} \rightarrow$ تعریف نشده

(الف) $\sin a = \frac{1}{4} \rightarrow a = 30^\circ, 150^\circ \rightarrow a = \frac{\pi}{6}, \frac{5\pi}{6}$
 (ب) $\cos a = \frac{\sqrt{2}}{4} \rightarrow a = 45^\circ, 315^\circ \rightarrow a = \frac{\pi}{4}, \frac{7\pi}{4}$

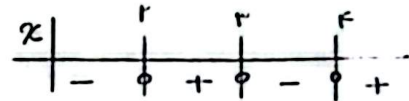


$$f(x) = \begin{cases} -x+1 & x > 1 \\ x^3 & -1 \leq x \leq 1 \\ -x-1 & x < -1 \end{cases}$$

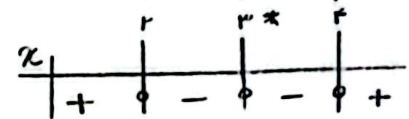


٦

الف) $y = (x-2)(x-3)(x-4)$ ریشه ها: 2, 3, 4

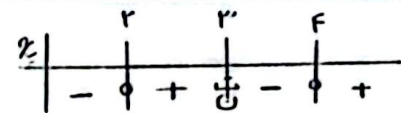


ب) $y = (x-2)(x-3)^2(x-4)$ ریشه ها: 2, 3*, 4

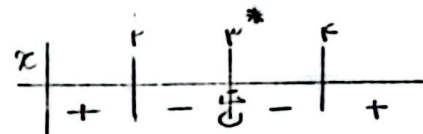


٧

الف) $y = \frac{(x-2)(x-4)}{x-3}$



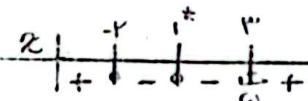
ب) $y = \frac{(x-2)(x-4)}{(x-3)^2}$



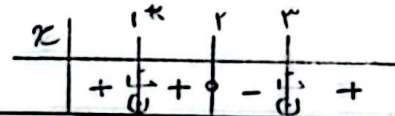
٨

الف) $y = \frac{x^4 - 3x^2 + 2}{x-1}$ $\rightarrow$ معادله درجه 4 $\rightarrow$ عبارت در 1 $\rightarrow x^4 - 3x^2 + 2 \div x-1$

$y = \frac{(x-1)^2(x+2)}{x-1}$ $\rightarrow$ ریشه ها: 1*, 2, 3

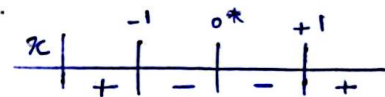


ب) $\frac{x^4 - 3x^2 + 2}{x^2 - 4x + 3} = \frac{(x-1)(x-1)}{(x-1)(x-3)}$ ریشه ها: 1*, 2, 3



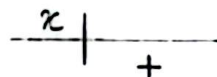
٩

الف) $y = \frac{x^2 - x^2}{x^2 + x + 2} = \frac{x^2(x^2-1)}{x^2+x+2}$ $\rightarrow$ ریشه ها: 0, ±1



$\Delta = b^2 - 4ac = 1 - 8 = -7 \rightarrow \Delta < 0$ ریشه ندارد

ب) $y = \frac{x^2 + 3x + 4}{x^2 + 2x + 3}$ $\rightarrow \Delta = 9 - 12 = -3 \rightarrow \Delta < 0$ ریشه ندارد
 $\rightarrow \Delta = 4 - 12 = -8 \rightarrow \Delta < 0$ ریشه ندارد



١٠