

۱) ریشه زبر، رادیکال، ریشه خارج

$$\Delta = 0 \rightarrow (m+3)^2 - 4m = 0 \rightarrow m^2 - 4m + 9 = 0 \rightarrow (m-3)^2 = 0 \rightarrow m = 3$$

$$2x^3 + a^2 \xrightarrow{x=a} 2a^3 + a^2 = 0 \Rightarrow a = -\frac{1}{3}$$

$$\lim_{x \rightarrow -\frac{1}{3}} \frac{\sqrt{4(x+\frac{1}{3})^2}}{|2x^3 + \frac{1}{9}|} = \frac{\sqrt{4(x+\frac{1}{3})^2}}{2|x^3 + \frac{1}{9}|} = \frac{\sqrt{4} |x + \frac{1}{3}|}{|x + \frac{1}{3}| |x^2 - \frac{x}{3} + \frac{1}{9}|} = \frac{\sqrt{4}}{\frac{x}{3}} = \frac{2\sqrt{4}}{x}$$

$$\frac{x \tan b}{\sqrt{-x}} \xrightarrow{x=a} \frac{x \tan b}{\frac{1}{\sqrt{x}}} = \frac{x\sqrt{x}}{1} \rightarrow x\sqrt{x} \tan b = \frac{x\sqrt{4}}{x} \quad (2)$$

$$\Rightarrow \tan b = \frac{\sqrt{x} \cdot b \cdot x}{x} \Rightarrow b = \frac{\pi}{4} \quad \checkmark$$

۲) یوسه نسبت و یک حد دارد، در نقطه ۱

$$\omega x^2 - ax + b = 0 \xrightarrow{x=1} \omega - a + b = 0 \Rightarrow a - b = \omega \Rightarrow a = 2, \quad b = -3$$

$$x^2 + ax + b \xrightarrow{x=1} 1 + a + b = 0 \Rightarrow a + b = -1 \quad (2)$$

$$\Rightarrow \begin{bmatrix} b - \omega a \\ \omega \end{bmatrix} = \begin{bmatrix} -3 \\ 2 \end{bmatrix} = \begin{bmatrix} -3 \\ 2 \end{bmatrix} \quad \checkmark$$

$$f(1) = f(1^+) \Rightarrow \tan \frac{\pi x}{k} = \frac{(x-i)(x+i)}{a(1-x)} \Rightarrow -1 = -\frac{\pi}{a} \Rightarrow a = \pi \quad (3)$$

$$f(\omega) = f(\omega^-) \Rightarrow b(1\omega) = \frac{-\pi}{1\pi} \Rightarrow b = -\frac{\pi}{\pi} \Rightarrow ab = (\pi)(-\frac{\pi}{\pi}) = -\frac{\pi}{1\omega} \quad \checkmark$$

(2)

$$f(n) = a[n] + a + b[n] + b[a] + b \quad (4)$$

در این تابع اگر عبارت $(a+b)$ را به $[n]$ و $(a+b)$ را به $[a]$ و $(a+b)$ را به $[b]$ تغییر دهیم.

$$a = -b \quad \leftarrow \text{مغایرت نیست بر این مسئله}$$

$$\Rightarrow f(n) = (a-a)[n] + a - a[a] - a = -a[a]$$

$$\Rightarrow \frac{a[a]}{-a[a]} = \frac{a[a]}{f(a)} = \boxed{-1} \quad \checkmark$$

$$\boxed{b=0} \quad \leftarrow \text{عادل مغایرت نیست بر این مسئله} \quad (5)$$

$$f(n) = -ra \Rightarrow f(a) = -ra \Rightarrow \frac{a}{-ra} = \boxed{-\frac{1}{r}} \quad \checkmark$$

$$a^r + am + n = 0 \quad \leftarrow \text{مغایرت نیست} \quad a^r + ram + n = 0 \quad \leftarrow \text{مغایرت نیست} \quad f(ra) = 0 \quad (6)$$

$$\Rightarrow a^r + am + n = ra^r + ram + n \Rightarrow -ra^r - am \Rightarrow m = -ra$$

$$\Rightarrow a^r - ra^r + n = 0 \Rightarrow n = ra^r$$

$$\lim_{n \rightarrow a} \frac{n^r - ran + ra^r}{a - n} = \frac{(n-a)(n-ra)}{\frac{(a-n)}{-1}} = -(n-ra) = -(a-ra) = a - r \Rightarrow a = r$$

$$\Rightarrow m = -ra = -r \quad n = ra^r = 1 \Rightarrow n - m = 1 + r = \boxed{1r} \quad \checkmark$$

$$\left. \begin{array}{l} n = 0^+ \Rightarrow (1-a)(0) + (ra^r - 1)(-1) = 1 - ra^r \\ n = 0 \Rightarrow b \sin \frac{\pi}{a} \\ n = 0^- \Rightarrow (1-a)(-1) + (ra^r - 1)(0) = a - 1 \end{array} \right\} \Rightarrow \begin{array}{l} 1 - ra^r = a - 1 \\ ra^r + a - r = 0 \end{array}$$

$$a + c = b \quad \rightarrow a = -1 \Rightarrow 1 - ra^r = 1 - r = -r, \quad a - 1 = -r$$

$$a = \frac{r}{p} \Rightarrow 1 - ra^r = 1 - \frac{r}{p} = -\frac{1}{p}, \quad a - 1 = -\frac{1}{p}$$

$$\Rightarrow b \sin \frac{\pi}{a} \quad a=1 \rightarrow b \sin(-\pi) = 0 \rightarrow a = -1 \quad \text{غلط} \quad \text{نظایم ازای } a=1 \quad \text{عبارت باید برابر با } (-\pi) \text{ شود.} \quad (7)$$

$$\Rightarrow a = \frac{p}{q} \Rightarrow b \sin \frac{\pi}{a} = b \sin \frac{q\pi}{p} = -b = -\frac{1}{p} \Rightarrow b = \frac{1}{p} \quad (2)$$

$$\Rightarrow \frac{a}{b} = \frac{\frac{p}{q}}{\frac{1}{p}} = \boxed{p} \quad \checkmark$$

$$\frac{|n^p + m - n - 1|}{m |n^p - 1| + |n - 1|} = \frac{|n - 1| |n + m + 1|}{|n - 1| (m |n + 1| + 1)} \quad (1, 5) \quad (8)$$

$$n=1 \rightarrow \frac{|m+1|}{p m + 1} \xrightarrow{m \rightarrow \frac{p}{q}} \frac{\frac{p^2 + (q - a)}{q |q - 1| |q + 1| + |q - 1|}}{\frac{p |q - 1| (q |q + 1| + 1)}{q}} = \frac{p^2 + (q - a)}{p |q - 1| (q |q + 1| + 1)}$$

$$\lim_{x \rightarrow \frac{1}{q}} \frac{a + \frac{1}{x}}{\frac{1}{x} + 1} = \frac{\frac{p}{q}}{\frac{1}{q} + 1} = \frac{p}{p + q} \quad \text{غلط}$$

$$\text{if } m < -p \Rightarrow -m^p - p m - p = p m^p + m \Rightarrow p m^p + a m + p = 0 \Rightarrow \Delta < 0$$

$$\text{if } m > -p \Rightarrow m^p + p m + p = p m^p + m \Rightarrow m^p - p m - p = 0$$

$$m = -p \Rightarrow \lim_{n \rightarrow \frac{p}{q}} f(n) = \frac{p}{\frac{p}{q}} = \frac{p^2}{q} \quad \text{غلط} \quad \lim_{n \rightarrow -1} f(n) = \boxed{1}$$

(9) صورت خروج در ازای $(n = a)$ با مخرج برابر می شود

$$\Rightarrow \sqrt{p} |a^p + a| = 0 \Rightarrow \begin{cases} a = 0 \rightarrow f(n) = 0 \quad \text{غلط} \\ a = -1 \rightarrow |-1 + (m - p) + 1| = 0 \end{cases}$$

$$\rightarrow m = p$$

$$\lim_{n \rightarrow -1} \frac{\sqrt{p} |-n - 1|}{|n^p + 1|} = \frac{\sqrt{p} |n + 1|}{|n + 1| |n^p + n + 1|} = \frac{\sqrt{p}}{p} \quad \checkmark \quad (2)$$

$$\lim_{n \rightarrow 0} \frac{n^p + |n|}{n^p + a |n|} = \frac{|n| + |n|}{|n| (|n| + a)} = \frac{|n| + 1}{|n| + a} \quad (10)$$

$$\text{با مخرج مساوی} \Rightarrow \frac{p a - 1}{p(a + 1)} = \frac{1}{a} \Rightarrow p a^2 - a = p a + p$$

$$\Rightarrow p a^2 - p a - p = 0 \xrightarrow{\text{تقسیم بر } p} a^2 - a - 1 = 0 \Rightarrow a = \frac{1 \pm \sqrt{5}}{2}$$

$$\lim_{n \rightarrow \frac{1}{p}} f(n) = \boxed{\frac{p}{\omega}} \quad \text{غلط} \quad \lim_{n \rightarrow \frac{1}{p}} f(n) = \boxed{\frac{p}{\omega}}$$

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