کیمیاییان آبادی

$$f(x)=\begin{cases}\dfrac{\sqrt{4x^2+(m+3)x+\frac{m}{4}\cdot\frac{3}{2}}}{|12x^3+(m-3)x^2+a^2|} \\ \\ \dfrac{2\tan b}{\sqrt{-x}}\end{cases} \to 4(x+\frac{1}{2})^2$$

$x\neq a \to$ ریشه‌ی صورت مخرج و زیر رادیکال

$\to \Delta=0 \to (m+3)^2-12m=0$

$m^2-6m+9=0 \to \boxed{m=3}$

$x=a \to a<0$

مخرج $\xrightarrow[m=3]{x=a} 2x^3+\cancel{(m-3)x^2}+a^2=0$

$\left.\begin{array}{l} 2a^3+a^2=0 \end{array}\right\} \to \boxed{a=-\frac{1}{2}}$

$$\lim_{x\to -\frac{1}{2}} \frac{\sqrt{4(x+\frac{1}{2})^2}}{|12x^3+\frac{3}{2}|} \quad \frac{\sqrt{4}\,\cancel{|x+\frac{1}{2}|}}{\ } = \frac{\sqrt{4}}{2|\frac{1}{4}+\frac{1}{4}+\frac{1}{4}|} = \frac{2\sqrt{4}}{3}$$

$$2|x^3+\frac{1}{8}|$$

$$\cancel{|x+\frac{1}{2}|}\,|x^2+\frac{1}{4}-\frac{x}{2}|$$

$$\frac{3}{4}\cdot 2$$

$$\xrightarrow{x=a} \frac{2\tan b}{\sqrt{-a}\ \frac{1}{\sqrt{2}}} = \frac{2\sqrt{6}}{3} \to \tan b=\frac{\sqrt{3}}{3} \xrightarrow[0<b<\pi]{} b=\frac{\pi}{6}$$

$5x^2 - ax + b = 0$

$\downarrow$

یکی از ریشه‌ها $\to x=1$

$5-a+b=0 \to a-b=5$

$f(x) = \frac{x^2+ax+b}{x-1} \xrightarrow{\text{یکی از ریشه‌ها} \to x=1} a+b=-1$

$\hookrightarrow$ در $x=1$ می‌تواند پیوسته نباشد

$$\begin{cases} a-b=5 \\ a+b=-1 \end{cases}$$

$2a=4 \quad a=2 \;\text{و}\; b=-3$

$-3 \quad -\frac{7}{3}$

$\left[\frac{b-2a}{3}\right] = -3$

$$f(x)=\begin{cases} \tan (2x+1)\pi \; ; & x\le 1 \\ \frac{|\overset{(x+2)(x-1)}{x^2+x-2}|}{a(1-x)} \; ; & 1<x<5 \\ b(x-[-x]) \; ; & x\ge 5 \end{cases}$$

$(x+2)(x-1) \to \; -2 \quad 1 \; : \; + \; - \; +$

$\xrightarrow{x=1} \tan\frac{3\pi}{4} = -1$

$\to \frac{(x+2)(x-1)}{a(1-x)} \xrightarrow{x=1} \frac{3}{-a} = -1 \to \boxed{a=+3}$

$\hookrightarrow_{x=5} \frac{7}{-a} = \frac{7}{-3}$

$\hookrightarrow_{x=5} b(5-\underbrace{[-5]}_{10}) = -\frac{7}{3} \to \boxed{b=-\frac{7}{30}} \quad \boxed{ab=-\frac{7}{10}}$

$f(x) = a[x+1] + b[x+[a+1]] = \underbrace{(a+b)}[x] + b[a] + b + a$

$a[x]+a \quad b[x] + b[a+1]$

$b+b[a]$

عامل صفر شونده، پشت براکت $=0$ $\to$ تابع پیوسته $\to a=-b$

$\to f(x) = -a[a] - \cancel{a} + \cancel{a}$

$\longrightarrow \frac{a[a]}{-a[a]\; f(x)} = -1$

$b[x^2-ax]-2a \longrightarrow f(x)=-2a \longrightarrow \frac{a}{-2a}=-\frac{1}{2}$

$\downarrow$

عامل صفرشونده پشت براکت $\rightarrow$ تابع در آن نقطه پیوسته می‌شود $\rightarrow b=0$

$$f(x)=\begin{cases}\dfrac{x^2+mx+n}{a-x} & x\neq a\\[2ex] 2 & x=a\end{cases}$$

$f(2a)=0 \longrightarrow$ صورت $=0 \longrightarrow 4a^2+2ma+n=0$

از طرفی $\longrightarrow a^2+am+n=0$

$\rightarrow -3a^2=am$

$m=-3a$

$a^2-3a^2+n=0 \rightarrow 2a^2=n$

$$\lim_{x\to a}\frac{\overbrace{x^2-3ax+2a^2}^{(x-a)(x-2a)}}{a-x}=-x+2a=\boxed{a=2}$$

$n-m=2a^2+3a=8+6=14$

$$f(x)=\begin{cases}(1-a)[x]+(3a^2-1)[-x] & x\notin Z\\ b\sin(\frac{\pi}{a}) & x\in Z\end{cases}$$

$\xrightarrow{x=0^+} (1-a)0+(3a^2-1)(-1)$

$1-3a^2$

$\xrightarrow{x=0} b\sin\frac{\pi}{a}$

$\xrightarrow{x=0^-} (-1+a)+0=a-1$

$=$

$\longrightarrow +3a^2+a-2=0 \rightarrow a=-1$

$\hookrightarrow a=\frac{2}{3}$

$\xrightarrow{a=-1} -2=b\sin(-\pi)$ غ‌ق‌ق

$\xrightarrow{a=\frac{2}{3}} -\frac{1}{3}=b\sin(\underbrace{\tfrac{3\pi}{2}}_{-1}) \rightarrow b=\frac{1}{3}$

$\frac{a}{b}=2$

$$f(x)=\begin{cases}\dfrac{|x^2+mx-m-1|}{m|x^2-1|+|x-1|} & x\neq 1\\[2ex] \dfrac{m}{m+2} & x=1\end{cases}$$

$$\dfrac{\cancel{|x-1|}\,|x+m+1|}{\cancel{|x-1|}\,(m|x+1|+1)}$$

$$\rightarrow x=1 \rightarrow \frac{|m+2|}{2m+1}=\frac{m}{m+2}$$

$$\xrightarrow{x<-2} -m^2-4m-4=2m^2+m$$

$$3m^2+5m+4=0 \quad \Delta<0 \quad \times$$

$$\xrightarrow{x>-2} m^2+4m+4=2m^2+m$$

$$m^2-3m-4=0 \rightarrow m=4\,,\,-1$$

$$\xrightarrow{m=4} \lim_{x\to\frac{1}{4}} f(x)=\frac{\frac{3}{2}}{\frac{9}{16}}=\frac{24}{9}$$

$$\xrightarrow{m=-1} \lim_{x\to -1} f(x)=1$$

$$f(x)=\frac{\sqrt{3}\,|ax+a|}{|x^3+(m-2)x+a^2|}$$

$$\xrightarrow[\text{صورت}]{x=a} \sqrt{3}\,|a^2+a|=0 \rightarrow \cancel{a=0}$$

$$a=-1$$

$$\rightarrow |-1+(m-2)+1|=0 \rightarrow m=2$$

$$\lim_{x\to -1}\frac{\sqrt{3}\,\cancel{|-x-1|}}{\cancel{|x^3+1|}\ |x^2+1-x|}=\frac{\sqrt{3}}{3}$$

$$f(x)=\begin{cases}\dfrac{x^2+|x|}{x^2+a|x|} & x\neq 0\\[2ex] \dfrac{2a-1}{2a+2} & x=0\end{cases}$$

$$\frac{\cancel{|x|}(|x|+1)}{\cancel{|x|}(|x|+a)}$$

$$\rightarrow \lim_{x\to 0} f(x)=\frac{1}{a}$$

$$\frac{1}{a}=\frac{2a-1}{2a+2}$$

$$2a^2-a=2a+2$$

$$\rightarrow \cancel{2}a^2-3a-\cancel{2}=0 \rightarrow a=-\frac{1}{2}\,,\,2$$

$$-4$$

$$(a-4)(a+1)$$

$$\lim_{x\to -2} f(x)=2$$

$$\lim_{x\to \frac{1}{2}} f(x)=\frac{3}{5}$$