(سارا امینی راد)

①

$$\frac{2x-5}{x^2+ax+b} \xrightarrow{\text{جایگذاری: }2} \frac{-1}{\;\;} = -\infty \Rightarrow a+b = -4+4 = 0$$

باید 0^+ باشد پس

$$(x-2)^2 \leftarrow x^2-4x+4$$

$a=-4 \quad b=4$

②

$$\frac{x}{x^2+ax+b} = +\infty \xrightarrow{x\to\sqrt[3]{4}} \frac{\sqrt[3]{4}}{\;\;} = +\infty$$

بنابراین 0^+ است

$$(x-\sqrt[3]{4})^2$$

$$x^2 - 2\sqrt[3]{4} + \sqrt[3]{16} \longrightarrow a = -2\sqrt[3]{4} \quad b = \sqrt[3]{\underset{8\times 2}{16}} = 2\sqrt[3]{2}$$

$$\left[\frac{b}{a}\right] = \left[\frac{2\sqrt[3]{2}}{-2\sqrt[3]{4}}\right] = \left[-\sqrt[3]{\frac{1}{2}}\right] = -1$$

③

$$\frac{[-x]+a}{\left|\frac{\sqrt{3}}{3}x+a\right|+a} = -\infty \longrightarrow \frac{\left[-\frac{\sqrt{3}}{3}\right]+a}{\left|\left(\frac{1}{3}\right)^+ + a\right|+a} = -\infty \rightarrow \frac{-1+a}{\left|\frac{1}{3}^+ + a\right|+a} = -\infty$$

$$x \to \left(\frac{+1}{\sqrt{3}}\right)^+ = \left(\frac{\sqrt{3}}{3}\right)^+$$

$$\left[-\frac{1}{6}\right] = -1$$

چون جواب بی‌نهایت شده پس مخرج صفر کوچک بوده 0^+

$$\frac{1}{3}+a+a = 0 \rightarrow 2a = -\frac{1}{3} \rightarrow a = -\frac{1}{6}$$

④

$$x > -\frac{1}{2} \rightarrow x^2 < \frac{1}{4} \rightarrow -x^2 > -\frac{1}{4} \rightarrow -\frac{1}{x^2} < -4 \rightarrow -\frac{2}{x^2} < -8$$

$$\left[-\frac{2}{x^2}\right] = -9$$

$$\lim_{x\to\left(-\frac{1}{2}\right)^+} \frac{16x - \left[-\frac{2}{x^2}\right]}{24x + \left[\frac{3}{x^2}\right]} \Rightarrow \frac{(-8)-(-9)}{(-12)^+ + 12} = \frac{1}{0^+} = +\infty$$

$$x > -\frac{1}{2} \rightarrow x^2 < \frac{1}{4} \rightarrow \frac{1}{x^2} > 4 \rightarrow \frac{3}{x^2} > 12 \rightarrow \left[\frac{3}{x^2}\right] = 12$$

$$x > -\frac{1}{2} \rightarrow 24x > -12$$

⑤

$$\lim_{x\to 2^+} \frac{x^2-4}{x^3-\underbrace{[x^3]}_{8}} = \frac{x^2-4}{x^3-8} = \frac{\cancel{(x-2)}(x+2)}{\cancel{(x-2)}(x^2+2x+4)} = \frac{x+2}{x^2+2x+4} = \frac{4}{4+4+4} = \frac{4}{12} = \frac{1}{3}$$

⑥

$$\frac{x^2+10x+16}{12+6\sqrt[3]{x}} \xrightarrow{\text{HOP}} \frac{2x+10}{\frac{6\times 1}{3\sqrt[3]{x^2}}} = \frac{\overset{-16}{2(-8)}+10}{\frac{1}{\frac{6}{3\sqrt[3]{64}}}} = \frac{-6}{\frac{1}{\frac{6}{12}}} = -12$$

⑦

$$\lim_{x\to 0^-} \frac{\sqrt{2+3x}-\sqrt{2-x}}{\sqrt{1-\cos x}} = \frac{\sqrt{2+3x}-\sqrt{2-x}}{(1-\cos x)^{\frac{1}{2}}} = \frac{\frac{3}{2\sqrt{2+3x}} - \frac{-1}{2\sqrt{2-x}}}{1-\frac{1}{2}\cos x} = \frac{\frac{3}{2\sqrt{2}} + \frac{1}{2\sqrt{2}}}{\frac{1}{2}} = \frac{\frac{4}{2\sqrt{2}}}{\frac{1}{2}} = \frac{4}{\sqrt{2}}$$

گویا کردن

$$2\sqrt{2} = \frac{4\sqrt{2}}{2}$$

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بنابراین صورت و مخرج هر دو صفر خواهند شد

(۸)

$$\lim_{x\to 0}\frac{k+\cos(\sqrt{a}\,x)}{kx^2}=3 \quad k+\cos(\sqrt{a}\times 0) \Rightarrow k+\cos 0=0 \to k=-1$$

$$\boxed{\frac{a}{k}=\frac{6}{-1}=-6}$$

$$\frac{-1+\cos\sqrt{a}\,x}{(-1)x^2} \Rightarrow \frac{1-\cos\sqrt{a}\,x}{x^2} \Rightarrow \frac{1-\cos(cx)}{x^2}=\frac{c^2}{2}=\frac{a}{2}=3 \quad a=6$$

(۹)

$$\sqrt{27a}=\sqrt{27a}$$

$a>0$

$$\lim_{x\to(3a)^+}\frac{2\sqrt{x-3a}+\cancel{3\sqrt{x}-\sqrt{27a}}}{\sqrt{x^2-9a^2}} \Rightarrow \frac{2}{\sqrt{x+3a}}=\frac{2}{\sqrt{9a}}=\frac{2}{3\sqrt{a}}$$

$$\frac{2\sqrt{x-3a}}{\sqrt{x^2-9a^2}}=\frac{2\cancel{\sqrt{x-3a}}}{\cancel{\sqrt{x-3a}}\sqrt{x+3a}}$$

(۱۰)

$$\lim_{x\to -1}\frac{1-k[x]}{x^2-1}=-\infty$$

x^2-1: $\quad + \;|\; -1 \;|\; - \;|\; 1 \;|\; +$

$(-1)^+$: $\dfrac{1-k(-1)}{0^-}=\dfrac{1+k}{0^-}=-\infty \to 1+k>0 \to k>-1$

$(-1)^-$: $\dfrac{1-k(-2)}{0^+}=\dfrac{1+2k}{0^+}=-\infty \to 1+2k<0 \to 2k<-1 \to k<-\frac{1}{2}$

$$-1<k<-\frac{1}{2}$$

ناحیه ۳ — $(k\pi,\ \cos k\pi)$ نقاط