۱ـ مخرج باید از دو طرف مثبت باشد

$$\lim_{x\to 2}\frac{2x-5}{x^2+ax+b}=-\infty \to \quad 2x-5\to(-1)<0$$

$$x^2+ax+b>0 \to (x-2)^2=x^2-4x+4$$

$$a+b=0$$

چون $x=2$ معادله تابع شده ریشه مخرج بوده و چون در هر دو طرف مثبت شده پس مرتبه ریشه زوج بوده

۲ـ

$$\lim_{x\to\sqrt[3]{4}}\frac{x\to\sqrt[3]{4}>0}{x^2+ax+b}=$$

$$(x-\sqrt[3]{4})^2=x^2-2\sqrt[3]{4}\,x+\sqrt[3]{16} \to a=-2\sqrt[3]{4}$$

$$b=\sqrt[3]{16}$$

$$\left[\frac{b}{a}\right]=\left[-\frac{\sqrt[3]{16}}{2\sqrt[3]{4}}\right]=\left[-\sqrt[3]{\frac{1}{2}}\right]=-1$$

$$0<\sqrt[3]{\frac{1}{2}}<1 \to 0>-\sqrt[3]{\frac{1}{2}}>-1$$

۳ـ

$$\lim_{x\to\left(\frac{1}{\sqrt{3}}\right)^+}\frac{[-x]+a}{\left|\frac{\sqrt{3}}{3}x+a\right|+a}=-\infty \qquad x>\frac{\sqrt{3}}{3}\to -x<-\frac{\sqrt{3}}{3}\to[-x]=-1$$

$$\lim_{x\to\frac{1}{\sqrt{3}}^+}\frac{a-1}{\left|\frac{\sqrt{3}}{3}x+a\right|+a}=$$

$$(1)\to \frac{\sqrt{3}}{3}x+a>0 \to \lim_{x\to\frac{1}{\sqrt{3}}^+}\frac{a-1}{\frac{\sqrt{3}}{3}x+2a} \to \frac{\sqrt{3}}{3}\times\frac{1}{\sqrt{3}}+2a=0\to a=-\frac{1}{6}$$

$$x>\frac{1}{\sqrt{3}}\to\frac{\sqrt{3}}{3}x>\frac{1}{3} \qquad \to \frac{-\frac{7}{6}}{\underbrace{\frac{\sqrt{3}}{3}x-\frac{1}{3}}_{0^+}}=-\infty$$

$$\to a=-\frac{1}{6}\to[a]=-1$$

-۴

$x > -\frac{۱}{۲} \Rightarrow \frac{۱}{x} < -۲ \Rightarrow \frac{۱}{x^۲} > ۴ \Rightarrow -\frac{۲}{x^۲} < -۸$

$\left[-\frac{۲}{x^۲}\right] = -۹$

$\frac{۳}{x^۲} > ۱۲$

$\left[\frac{۳}{x^۲}\right] = ۱۲$

$$\lim_{x \to -\frac{۱}{۲}^{+}} \frac{۱۶x+۹}{۲۴x+۱۲} = \frac{۱}{۰^{+}} = +\infty$$

$x>2 \to x^3>8 \to [x^3]=8$

$$\lim_{x\to 2}\frac{x^2-4}{x^3-8} \overset{HOP}{=} \lim_{x\to 2}\frac{2x}{3x^2} = \frac{4}{12}=\frac{1}{3}$$

-10

$K>0$

$K>-\frac{1}{?}$

$=-\infty$

-6

$$\lim \frac{x^2+10x+16}{12+6\sqrt[3]{x}} = \frac{(x+2)(x+8)}{6(\sqrt[3]{x}+2)}$$

$$=\frac{(x+2)(\sqrt[3]{x}+2)(\sqrt[3]{x^2}-2\sqrt[3]{x}+4)}{6(\sqrt[3]{x}+2)}$$

$$=\frac{(x+2)(\sqrt[3]{x^2}-2\sqrt[3]{x}+4)}{6} = -\frac{6\times 12}{6} = -12$$

-7

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

$$\sqrt{2\left(1+\frac{3}{2}x\right)} = \sqrt{2}\underbrace{\sqrt{1+\frac{3}{2}x}}_{\left(1+\frac{3}{2}x\right)^{\frac{1}{2}}} = \sqrt{2}\times\left(1+\frac{3}{4}x\right)$$

$$\sqrt{2-x} = \sqrt{2\left(1-\frac{x}{2}\right)} = \sqrt{2}\underbrace{\sqrt{1-\frac{x}{2}}}_{\left(1-\frac{x}{2}\right)^{\frac{1}{2}}} = \sqrt{2}\times\left(1-\frac{1}{4}x\right)$$

صورت $\to \sqrt{2}\left(1+\frac{3}{4}x-1+\frac{1}{4}x\right)=\sqrt{2}\,x$

مخرج $\sqrt{\frac{x^2}{2}} = \frac{|x|}{\sqrt{2}} \xrightarrow{x<0} \frac{-x}{\sqrt{2}}$ $\Big\}$ $\sqrt{2}\cancel{x}\times\frac{\sqrt{2}}{-\cancel{x}} = -2$

$\cos(\sqrt{a}\,x) = 1 - \frac{ax^2}{2}$ — ۸
هم‌ارزی

$\lim_{x\to 0} \frac{k+1-\frac{ax^2}{2}}{kx^2} \underset{Hop}{=} \frac{-ax}{2kx} = \frac{-a}{2k} = 3$ →

$a = -6k$

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

۹-

$Hop \to \dfrac{\frac{2}{2\sqrt{x-3a}} + \frac{3}{2\sqrt{x}}}{\frac{2x}{2\sqrt{x-3a}\sqrt{x+3a}}}$

$\left(\frac{1}{\sqrt{x-3a}} + \frac{3}{2\sqrt{x}}\right)\left(\frac{\sqrt{x-3a}\sqrt{x+3a}}{x}\right)$

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

$= \frac{\sqrt{6a}}{3a}$

۱۰-

$x \to -1^{+} \to \lim \frac{1+k}{x^2-1} = -\infty$

$[x] = -1$, $x^2-1 \to 0^-$

$1+k > 0$

$k > -1$ ①

$x \to -1^{-} \to \lim_{x\to -1} \frac{1+2k}{0^+} = -\infty$

$[x] = -2$

$1+2k < 0 \to k < -\frac{1}{2}$ ②

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

$-\pi < k\pi < \frac{-\pi}{2} \to$ طول ده

$\to \cos k\pi < 0$ عرض ده

ناحیه ۳

lim