Subject: ______ Date: حل‌ها

(۱)

$$\lim_{x\to 2}\frac{2x-5}{x^2+ax+b}\longrightarrow\frac{2\times2-5}{x^2+ax+b}=\frac{-1}{0\to 0^+}=-\infty$$

$$(x-2)^2=x^2-4x+4\longrightarrow a=-4,\ b=4\longrightarrow a+b=4-4=0$$

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(۲)

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

$$(x-\sqrt[3]{4})^2=x^2-2\sqrt[3]{4}\,x+2\sqrt[3]{2}\longrightarrow a=-2\sqrt[3]{4}\quad b=2\sqrt[3]{2}$$

$$\left[\frac{b}{a}\right]=\left[\frac{2\sqrt[3]{2}}{-2\sqrt[3]{4}}\right]=\left[\frac{2^{\frac{4}{3}}}{-2^{\frac{5}{3}}}\right]=-1$$

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(۳)

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

برای اینکه جواب $-\infty$ شود صورت باید + مخرج منفی یا صورت منفی و مخرج مثبت باشد

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

$$a>\frac{-1}{3}\longrightarrow\frac{-1+a}{\frac{1}{3}^+ +2a}=-\infty\ \star$$

$$\frac{-1}{3}>a\longrightarrow\frac{-1+a}{\frac{-1}{3}}=-\infty\longrightarrow$$ اصلا $-\infty$ جوابش نمیشه غ ق ق

$$\star\ \frac{-1+a}{\frac{1}{3}+2a}=-\infty\Longrightarrow\frac{1}{3}^+ +2a=0\longrightarrow a=\frac{-1}{6}=0^+\longrightarrow$$ صورت هم که منفی است

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

Subject: Date:

-9

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

12

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

۶) $$\lim_{x\to -8} \frac{x^2+10x+16}{12+6\sqrt[3]{x}} = \frac{(x+2)(x+8)}{6(2+\sqrt[3]{x})} = \frac{(x+2)\cancel{(x+8)}(4+(\sqrt[3]{x})^2-2\sqrt[3]{x})}{6\cancel{(8+x)}}$$

$$= \frac{(\overset{-6}{-8+2})(\overset{12}{4+4+4})}{6} = -12$$

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

$$\frac{4x}{(-\sin x)2} = -2$$

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

برای اینکه شبیه مخرج بود باید صورت $k=-1$

$$\frac{-ax^2}{2kx^2} = \frac{-a}{2k} = 3 \Rightarrow \frac{a}{k} = -6$$

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

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

$$\frac{2}{\sqrt{x+3a}}+\frac{3(\sqrt{x}-\sqrt{3a})}{(\sqrt{x-3a})(\sqrt{x+3a})}\times\frac{(\sqrt{x}+\sqrt{3a})(\sqrt{x^2-9a})}{(\sqrt{x^2-9a})(\sqrt{x}+\sqrt{3a})}=\frac{2}{\sqrt{x+3a}}+\frac{3(x-3a)\overset{0}{(\sqrt{x^2-9a})}}{(x-3a)(x+3a)(\sqrt{x}+\sqrt{3a})}$$

$$=\lim\frac{2}{\sqrt{x+3a}}+0=\frac{2}{\sqrt{6a}}=\frac{\sqrt{6a}}{3a}$$

$$\lim_{x\to -1}\frac{1-k[x]}{x^2-1}=-\infty\qquad (k\pi,\ \cos k\pi)$$ (10)

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

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

$$-1<k<\frac{1}{2}\longrightarrow -\pi<k\pi<\frac{-\pi}{2}\rightarrow$$ ربع سوم

$$\rightarrow \cos-\pi<\cos k\pi<\cos\frac{-\pi}{2}\longrightarrow$$ ربع سوم

$$-1<\cos k\pi<0$$