تکلیف شماره ی ۲۰ | نوید امینی

۱) $\lim\limits_{x\to 2} \dfrac{2x-5}{x^2+ax+b} = -\infty \to \dfrac{4-5=-1}{x^2+ax+b} \to x^2+ax+b=(x-2)^2 = x^2-4x+4 \to a+b=0$ ($a=-4$, $b=4$)

۲) $\lim\limits_{x\to \sqrt[3]{4}} \dfrac{x}{x^2+ax+b} = +\infty \longrightarrow \dfrac{\sqrt[3]{4}}{x^2+ax+b} = +\infty \to x^2+ax+b = (x-\sqrt[3]{4})^2 = 0$

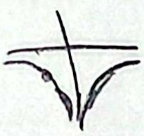
$x^2 - 2\sqrt[3]{4}\,x + \sqrt[3]{16}$

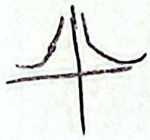
$\dfrac{2^{\frac{4}{3}}}{-2^{\frac{5}{3}}} = -2^{-\frac{1}{3}} = \dfrac{-1}{\sqrt[3]{2}_{1/1}} \to -1<5<0 \quad [5]=-1$

۳) $\lim\limits_{x\to \frac{1}{\sqrt{3}}^+} \dfrac{[-x]+a}{\left|\frac{\sqrt{3}}{3}x+a\right|+a} = -\infty \to \dfrac{-1+a}{\left|\frac{1}{3}+a\right|+a} = -\infty \to \dfrac{-1+a}{\frac{1}{3}+2a} = \dfrac{-\frac{7}{6}}{0}$

اگر $a<0 \to -\frac{1}{3}-a+a \neq 0 \qquad \frac{1}{3}+2a=0 \to a=-\frac{1}{6} \to [-\frac{1}{6}]=-1$

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

$-\dfrac{2}{x^2}$  $\to (-\frac{1}{2})^+ \Rightarrow -8^- = [-8^-] = -9$

$\dfrac{3}{x^2}$  $(-\frac{1}{2})^+ \Rightarrow 12^+ \to [12^+]=12$

۵) $\lim\limits_{x\to 2^+} \dfrac{x^2-4}{x^3-[x^3]} = \dfrac{(\cancel{x-2})(x+2)}{(\cancel{x-2})(x^2+2x+4)} = \dfrac{2+2}{4+4+4} = \dfrac{4}{3(4)} = \dfrac{1}{3}$

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

۷) $\lim\limits_{x\to 0^-} \dfrac{\sqrt{2+3x}-\sqrt{2-x}}{\sqrt{1-\cos x}} \times \dfrac{\quad}{\quad} = \dfrac{\cancel{2}+3x\cancel{-2}+x}{\sqrt{2}|\sin x| \times 2\sqrt{2}} = \dfrac{4x}{4|\sin x|} = -1$

۸) $\lim\limits_{x\to 0} \dfrac{k+\cos(\sqrt{a}x)}{kx^2} = 3 \xrightarrow[\frac{0}{0}]{HOP} \dfrac{-\sqrt{a}\sin(\sqrt{a}x)}{2kx} \xrightarrow{HOP} \dfrac{-a\cos\sqrt{a}x}{2k} = 3 = \dfrac{-a}{2k} = 3 \to \dfrac{a}{k} = -6$

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$$\lim_{x\to(۳a)^+}\frac{۲\sqrt{x-۳a}+۳\sqrt{x}-\sqrt{۲۷a}}{\sqrt{x^۲-۹a^۲}}=\frac{۲\sqrt{x-۳a}}{\sqrt{x^۲-۹a^۲}}+\frac{۳\sqrt{x}-۳\sqrt{۳a}}{\sqrt{x^۲-۹a^۲}}=۲\sqrt{\frac{۱}{x+۳a}}+۳\frac{(x-۳a)}{\sqrt{x^۲-۹a^۲}}\times\frac{۱}{(\sqrt{x}+\sqrt{۳a})}$$

$$=۲\sqrt{\frac{۱}{۳a+x}}+۳\sqrt{\frac{\cancel{(x-۳a)}^{\,۰}\ ^{۲}}{\cancel{(x-۳a)}(x+۳a)}}\times\frac{۱}{x+۳a}=۲\sqrt{\frac{۱}{۳a+۳a}}=\sqrt{\frac{۴}{۶a}}=\sqrt{\frac{۲}{۳a}}$$

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$$\lim_{x\to-۱}\frac{۱-k[x]}{x^۲-۱}=-\infty$$

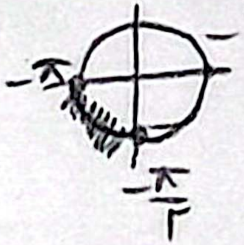
$$\xrightarrow{-۱^+}\frac{۱-k(-۱)}{۰^-}=\frac{۱+k}{۰^-}=-\infty\to ۱+k>۰\to k>-۱$$

$$\xrightarrow{-۱^-}\frac{۱-k(-۲)}{۰^+}=\frac{۱+۲k}{۰^+}=-\infty\to ۱+۲k<۰\to k<-\frac{۱}{۲}$$

$$\to -۱<k<-\frac{۱}{۲}$$

$$-\pi<k\pi<-\frac{\pi}{۲}$$

$$-۱<\cos k\pi<۰$$



$\cos<۰$ ناحیه سوم

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