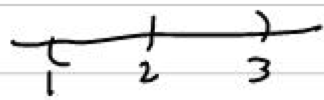
9-14-09

1) $\lim_{x\to 2}(x^2-3)=1$

$|x^2-3-1|<.01$

$|x^2-4|<.01$

$|x+2|\cdot|x-2|<.01$



$|x-2|<\frac{.01}{|x+2|}$

$\delta=\frac{.01}{5}=\frac{1}{500}=.002$

10) $f(x)=\frac{x}{\sin x}$ $x\neq k\pi,\ k\neq 0$

$\lim_{x\to 0}\frac{x}{\sin x}=\lim_{x\to 0}\frac{1}{\frac{\sin x}{x}}=\frac{1}{1}=1$

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

$$\begin{array}{r|rrrr} 2 & 1 & 0 & 0 & -8 \\ & & 2 & 4 & 8 \\ \hline & 1 & 2 & 4 & \end{array}$$

x^2+2x+4

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

$|2x-1-5|<\epsilon$ Not proof

$|2x-6|<\epsilon$

$2|x-3|<\epsilon$

$|x-3|<\frac{\epsilon}{2}$

let $y=2x-1$ since y is defined $\forall$ all $\mathbb{R}$, it is defined for all x over some open interval containing 3.

$\forall$ any $\epsilon>0$ let $\delta=\frac{\epsilon}{2}$

whenever $0<|x-3|<\delta$

then $|x-3|<\frac{\epsilon}{2}$ $2|x-3|<\epsilon$

$|2x-6|<\epsilon$ $|(2x-1)-5|<\epsilon$

In proving $\lim_{x \to 2} (5x - 1) = 9$

which of the following could be δ?

a) ϵ b) 5ϵ c) $\frac{\epsilon}{3}$ d) $\frac{\epsilon}{4}$ e) $\frac{\epsilon}{6}$

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23) $\lim_{\Delta x \to 0} \frac{\sin(\frac{\pi}{6} + \Delta x) - \frac{1}{2}}{\Delta x}$

$\lim_{\Delta x \to 0} \frac{\sin\frac{\pi}{6} \cos\Delta x + \cos\frac{\pi}{6} \sin\Delta x - \frac{1}{2}}{\Delta x}$

$\lim_{\Delta x \to 0} \frac{\frac{1}{2}\cos\Delta x + \frac{\sqrt{3}}{2}\sin\Delta x - \frac{1}{2}}{\Delta x}$

$\lim_{\Delta x \to 0} \frac{\sqrt{3}}{2} \frac{\sin\Delta x}{\Delta x} + \lim_{\Delta x \to 0} \frac{1}{2} \frac{(\cos\Delta x - 1)}{\Delta x}$

$\frac{\sqrt{3}}{2}(1) + \frac{1}{2}(0) = \sqrt{3}/2$

28) $\lim_{x \to 1} \frac{1 - \sqrt[3]{x}}{x - 1} = \lim_{x \to 1} \frac{(1 - \sqrt[3]{x})(1 + \sqrt[3]{x} + \sqrt[3]{x^2})}{(x - 1)(1 + \sqrt[3]{x} + \sqrt[3]{x^2})} =$

$= \lim_{x \to 1} \frac{1 - x}{(x-1)(1 + \sqrt[3]{x} + \sqrt[3]{x^2})} = \lim_{x \to 1} \frac{-1}{1 + \sqrt[3]{x} + \sqrt[3]{x^2}}$

$= \boxed{-\frac{1}{3}}$