

① Suppose  $0 < s_n < \frac{n+1}{n}$ . Show - using  $\epsilon$ - $\delta$  argument - that  $\limsup (s_n) \leq 1$ .

② Show that  $\sum_{n=1}^{\infty} \frac{1}{n(\log n)^2 - \pi}$  converges.

③ Let  $E_1$  and  $E_2$  be bounded sets in  $\mathbb{R}$ . Show that  $\overline{E_1} \cap \overline{E_2} \neq \emptyset$  if  $\inf \{ |x-y| : x \in E_1, y \in E_2 \} = 0$ .

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