

problem session 1

- Find the $\limsup_{n \rightarrow \infty}$ and $\liminf_{n \rightarrow \infty}$

$$(1) x_n = 2^{n(-1)^n}$$

$$(2) x_n = 1 + (-1)^n + 2(-1)^{\left[\frac{n}{2}\right]}$$

$$(3) x_n = \left(1 + \frac{1}{n}\right)^n (-1)^n + 3 \ln \frac{n\pi}{4}$$

$$(4) x_n = (1 + (-1)^n)n$$

$$(5) x_n = (-1)^n \left(1 + \frac{1}{n}\right)^n + 3 \ln \frac{2n\pi}{3}$$

$$(6) x_n = \sum_{k=0}^n 4^k (k!) (-1)^k$$

$$(7) x_n = \sum_{k=1}^n (-1)^k$$

$$(8) x_n = \left(1 + \frac{1}{n^{1/2}}\right)^n \left(1 + \frac{(-1)^n}{n^{3/2}}\right)^{n^2}$$

$$(9) \text{ let } x_1 = 0, \quad x_{n+1} = \frac{1}{2 - x_n} \quad n \in \mathbb{N}^+$$

- prove $\inf_{1 < x < 2} \frac{1+2x}{x} = \frac{5}{2}$

- Rudin 1.5, 2.5, 3.1, 2.3, 4, 5