

# Assignment 1 - Convergence

MTH101, FALL 2017. IISER PUNE.

---

1. Using triangle inequality, show that for any real numbers  $x, y, z$

$$|x - z| \leq |x - y| + |y - z|.$$

2. Let  $(x_n)$  be the sequence defined by

$$x_n = \begin{cases} 0 & \text{if } n \text{ is odd} \\ 1 & \text{if } n \text{ is even} \end{cases}.$$

Show that  $\lim_{n \rightarrow \infty} x_n$  does not exist.

3. Show that  $\lim_{n \rightarrow \infty} \frac{n^2}{n^2+1} = 1$ .