THE CHINESE UNIVERSITY OF HONG KONG
Department of Mathematics
MATH 2058 Honours Mathematical Analysis I 2022-23
Homework 8
16th November 2022

- Homework will be posted on both the course webpage and blackboard every Tuesday. Students are required to upload their solutions on blackboard by 23:59 p.m. next Thursday. Additional announcement will be made if there are no homework that week.

- Please send an email to echlam@math.cuhk.edu.hk if you have any questions.

1. (P.140 Q4) Show that every polynomial of odd degree with real coefficients has at least one real root.

2. (P.140 Q13) Suppose $f : \mathbb{R} \to \mathbb{R}$ is a continuous function, with $\lim_{x \to -\infty} f = \lim_{x \to \infty} f = 0$, prove that f is bounded on $\mathbb{R}$ and attains a maximum or a minimum on $\mathbb{R}$. Demonstrate an example in which only one of maximum or minimum occurs.

3. (P.148 Q2) Show that the function $f(x) = 1/x$ is uniformly continuous on $A = [1, \infty)$ but not uniformly continuous on $(0, \infty)$.