

THE CHINESE UNIVERSITY OF HONG KONG
Department of Mathematics
MATH 2058 Honours Mathematical Analysis I 2022-23
Homework 2
27th September 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 Tuesday. 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.62, Q6 part b,d) Prove the following limits using ϵ arguments.

(b) $\lim_{n \rightarrow \infty} \frac{2n}{n+2} = 2.$

(d) $\lim_{n \rightarrow \infty} \frac{(-1)^n n}{n^2+1} = 0.$

2. (P.70, Q23) Show that if (x_n) and (y_n) are convergent, then the sequences (u_n) and (v_n) defined by $u_n = \max\{x_n, y_n\}$ and $v_n = \min\{x_n, y_n\}$ are also convergent.
3. (P.77, Q4) Let (x_n) be a sequence defined recursively by $x_1 = 1$ and $x_{n+1} = \sqrt{x_n + 2}$, prove that (x_n) is convergent and find its limit.