MMAT5010 Linear Analysis (2024-25): Homework 8
Deadline: 12 April 2025

Important Notice:

1. Suppose that the finite sequences space c_{00} is endowed with the sup-norm. For each $n = 1, 2...$, define $T_n : c_{00} \to c_{00}$ by

$$T_n(x)(k) := \begin{cases} kx(k) & \text{as} \quad 1 \le k \le n \\ 0 & \text{as} \quad k > n. \end{cases}$$

   for $x \in c_{00}$ and $k = 1, 2....$

   (a) Show that each T_n is bounded.

   (b) Show that $T(x) := \lim_n T_n(x)$ exists for all $x \in c_{00}$.

   (c) Show that T is unbounded.

$* * *$ **End** $* * *$