

MATH 201 FALL 2025 GRADED HOMEWORK #3

Write clearly, on separate paper if needed. All questions carry equal weight.

- (1) Consider a sequence with domain $\mathbb{N}$. Suppose that the subsequence with domain $3\mathbb{N}$ converges to a limit L_3 , while the subsequence with domain $5\mathbb{N}$ converges to a limit L_5 . Show that $L_3 = L_5$.

- (2) Determine the limit of the sequence

$$\left\{ \frac{\cos n}{1+n} \right\}_{n \in \mathbb{N}},$$

carefully justifying each step in obtaining your answer.

- (3) Suppose that a sequence with domain U has a nonzero limit L . Determine the domain T of a tail which has no zero terms.