MA221 – Analysis I : Real Analysis
2017 Autumn Semester

[You are expected to write proofs / arguments with reasoning provided, in solving these questions.]

Homework Set 1 (*due by Friday, August 25*, in class or TA's office hours)

Question 1. Prove the 'Archimedean property for $\mathbb{Q}$' without using the real numbers or Dedekind cuts, only using properties of the rationals (including the ordering in them).

Question 2. Rudin Chapter 1 Problem 5.

Question 3. (a) Solve Rudin Chapter 1 Problem 6 (using existence of nth roots, proved in class).

(b) Now propose a definition for b^x where $b \in (0, 1]$ and $x \in \mathbb{R}$. (Note that part (a) assumed $b > 1$.)

(c) Using the definition from part (b), prove for $b \in (0, 1]$ that $b^{x+y} = b^x b^y$ for all $x, y \in \mathbb{R}$.

Question 4. Rudin Chapter 1 Problem 16.

Question 5. Rudin Chapter 1 Problem 17.

(Hint: Read the proof of the triangle inequality.)

Question 6. Rudin Chapter 1 Problem 18.