

Read Apostol, Volume I, Introduction, Part 3, sections 3.1-3.15, pages 17-32.

1. From Apostol, I.3.3, page 19, do problems 3, 5.
2. From Apostol, I.3.5, page 21, do problems 8, 10.
3. From Apostol, I.3.12, page 28, do problems 2, 8.
4. Prove that no rational number is a solution to $x^2 = 7$.
5. For each of the following sets of real numbers, determine whether there is an upper bound in \mathbb{R} , and if so find one. Do the same concerning a least upper bound (supremum) of the set in \mathbb{R} . If there is a least upper bound for the set, determine whether this number lies in the set. Explain your assertions. (Recall the notation: \mathbb{R} is the set of real numbers; \mathbb{Q} is the set of rational numbers.)
 - (a) $S_1 = \{x \in \mathbb{R} \mid 6x \geq x^2 + 2\}$
 - (b) $S_2 = \{x \in \mathbb{Q} \mid 6x \geq x^2 + 2\}$
 - (c) $S_3 = \{x \in \mathbb{R} \mid 6x \leq x^2 + 2\}$
 - (d) $S_4 = \{x \in \mathbb{R} \mid 6x \geq x^2 + 10\}$