Math 116 Problem Set #1 Due Fri., Sept. 18, 2009, in class.

Read Apostol, Introduction, part 3, sections 3.1-3.9, pages 17-25; and Chapter 9, sections 1-7, pages 358-368.

Optional: Also read sections 3.10-3.15 of the Introduction, pages 25-32.

1. From Apostol, I.3.3, page 19, do problems 2,4,8.

2. From Apostol, I.3.5, page 21, do problems 2,9.

3. From Apostol, I.3.12, page 28, do problems 2,3.

4. From Apostol, 9.6, page 365, do problems 1 (c,d), 3 (g,j), 6,7.

5. Prove that no rational number is a solution to $x^2 = 5$.

6. For each of the following sets of real numbers, determine whether there is an upper bound in $\mathbb{R}$. If possible, find the least upper bound (supremum) of the set, and determine whether this number lies in the set.

(a) $S_1 = \{x \in \mathbb{R} \mid 4x \geq x^2 + 1\}$
(b) $S_2 = \{x \in \mathbb{Q} \mid 4x \geq x^2 + 1\}$
(c) $S_3 = \{x \in \mathbb{R} \mid 4x \leq x^2 + 1\}$

7. Find all complex numbers z such that $z^8 = 16$. [Hint: First use modulus and argument, and then re-write the numbers in the form $a + bi$.]