MATH 2513 Homework 7 Due 3/14/19 (Thursday)

Please explain briefly but clearly your reasoning (unless it is totally obvious from your answer, i.e., when you have to list the elements of a set or to draw a set in the plane).

Please write the problems in the same order as they are given in the assignment.

Note that the odd-numbered problems have answers at the end of Hammack's book. I strongly suggest that you do *all* odd-numbered problems for practice; moreover, many of them are very similar to the assigned homework problems.

Hammack, Chapter 4: Exercises 12, 14, 16, 24, 26.

Hammack, Chapter 5: Exercises 4, 6, 16, 18, 28.

Hammack, Chapter 6: Exercises 6 (see the text in Chapter 6), 10 (see Exercise 11).

Additional Problem 1. Suppose that $x, y \in \mathbb{Z}$. Prove that if $x^2(y+3)$ is even, then x is even or y is odd.

Additional Problem 2.

(a) Use contrapositive proof to show that if $a \in \mathbb{Z}$ and $3|a^2$, then $3|a$.

(b) Use the fact from part (a) to prove that the number $\sqrt{3}$ is irrational by using contradiction. (Follow the same logic as in the proof of irrationality of $\sqrt{2}$.)