Math 219: Homework 6
Due: Monday, April 21st

1) Take a rectangular piece of paper with sides of length n inches and m inches. Remove from it the largest possible square. Repeat the process with the left-over rectangle. What different things can happen? Predict what will happen given an $n \times m$ square, and justify why this is correct.

2) Write down a sequence of 0's and 1's. Underneath each consecutive pair write a 0 if they are the same and a 1 if not. Repeat this process unit you are left with a single digit. Can you predict what the final digit will be and explain why this is the case?

3) When the first Martian to visit Earth attended a high school algebra class, it watched the teacher show that the only solution of the equation

$$5x^2 - 50x + 125 = 0$$

is $x = 5$.

"How strange," thought the Martian. "On Mars, $x = 5$ is a solution of this equation, but there also is another solution." If Martians have more fingers than humans, how many fingers do Martians have?

4) Suppose that you wish to weigh sugar with an old-fashioned balance. You want to be able to weigh all possible integer values between 1 gram and 127 grams. How few weights are needed? Be sure to justify that your answer is correct.