1. Find all real numbers x satisfying

$$\lfloor x+5 \rfloor = \lfloor 3x \rfloor \ .$$

   Show your work. HINT: Every real number x can be written as $n+\epsilon$ where n is an integer and ϵ is a real number such that $0 \leq \epsilon < 1$.

2. Problems 73 and 74 on page 155 of Rosen.

3. Show that if $10|n^2$ then $10|n$ (without using the Unique Factorization Theorem).

4. Show that $\sqrt{10}$ is irrational.
   (a) Use the Unique Factorization Theorem.
   (b) Do not use the Unique Factorization Theorem.

5. For each sequence, write a simple, closed-form expression for the ith term. HINT: It can sometimes be helpful look at the difference of consecutive terms $(a_{i+1} - a_i)$ or the ratio of consecutive terms (a_{i+1}/a_i) to see what is happening.
   (a) 1, -4, 27, -256, ...,
   (b) 1, 5, 9, 13, 17, 21, 25, ...,
   (c) 1, 2, 7, 16, 29, 46, 67, 92, ...,

6. Problem 38 on page 169 of Rosen.

7. A triangle number is a number of the form: 1, 1+2, 1+2+3, etc.

   Give an explicit mapping to show that triangle numbers have the same cardinality as the the positive integers divisible by 5 ($\{n \in \mathbb{Z}^+$ such that $5|n\}$). You should produce a function that is a bijection. It should be an explicit formula not involving cases.