Exercises for Chapter 4

Exercise 38. Let q be a positive real number. Prove or disprove the following statement: if q is irrational, then $\sqrt{q}$ is irrational.

Exercise 39. Prove using mathematical induction that the sum of the first n odd positive integers is n^2.

Exercise 40. Prove using mathematical induction that $n^3 - n$ is divisible by 3 whenever n is a positive integer.

Exercise 41. Prove by mathematical induction that

$$1^2 + 2^2 + \ldots + n^2 = \frac{1}{6}n(n+1)(2n+1).$$