Homework 44

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Introduction

- The sum of two odd integers is even.
  - 3 + 3 = 6
- The sum of two even integers is even.
  - 2 + 2 = 4
- The square of an even number is even.
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- The product of two odd integers is odd.
  - Let a and b any integers so that 2a and 2b are two even numbers
  - 2(2mk + m + k) + 1 = odd number
- $n^3 + 5$ is odd then n is even
  - n = 2k + 1 for some integer k
  - $3(2k + 1 + 2 = 6k + 5 = 2(3k + 2) + 1$
  - thus n is even
- If $3n + 2$ is even then n is even
  - if n was odd = 3n + 2 = odd x odd + even = odd + even = odd
  - thus n can't be odd, so it is even
- The sum of a rational number and an irrational number is irrational.
  - $3 + \sqrt{5} = 3 + 2.236067977... = 5.236067977$
  - which is irrational
- The product of two irrational numbers is irrational.

  - $\frac{6}{1} x \frac{6}{1} = \frac{6}{1}$ which is rational

- Use mathematical induction to prove that the first n even integers add up to $n(n+1)$
  - $n = 2$
  - first 2 even numbers are 2 and 4 add up to 6.
  - thus $2(2+1) = 6$

- Use mathematical induction to prove that $n^3 + 2n$ is divisible by 3.
  - $n = 1$ -¿ $1^3 + 2(1)/\ 3$
  - we are left with 3/3 which = 1
  - so it is divisible by 3