MATH 102: IDEAS OF MATH

WORKSHEET 8: INDUCTION (CONT.)

Question 1. Show that

$$1 \cdot 3 \cdot 5 \cdot \cdots \cdot (2n - 1) = \frac{(2n)!}{2^n n!} \,.$$

Question 2. What is the difference between regular induction and strong induction?

Question 3. Prove the Fundamental Theorem of Arithmetic.
Every integer $n \geqslant 2$ is either prime or a unique product of primes.

Question 4. Let's talk about investment. Let's say we have a new company called Orange, specializing in making toy tanks and barbie houses. If every year, 1 stock the company you earn you 1 dollar dividend and the inflation rate is 5%. How much are you willing to pay for a stock in that company?

Question 5. What do you think the final value of

$$1 + \frac{1}{2} + \frac{1}{3} + \cdots + \frac{1}{n}?$$

How about
$$1 + \frac{1}{2} + \frac{1}{3} + \ldots?$$

Question 6. Discuss Fake Proposition 4.11. and Fake Proposition 4.12.