

Homework # 1 (Due August 22).

- Read pages 1-8 in the textbook.
- Learn axioms of field from the handout.

Do the following problems:

(Note that these problems are mostly a review of topics covered in the classes you took before, such as Discrete Math 1 or Intro to Proofs).

1. a) Prove that $\sqrt{15}$ is irrational.
b) Use part a) to prove that number $\sqrt{3} + \sqrt{5}$ is irrational.

2. Use the mathematical induction to prove that

a) $a + aq + aq^2 + \dots + aq^n = a \cdot \frac{1 - q^{n+1}}{1 - q}$, for all $n \in \mathbb{N}$; $a, q \in \mathbb{R}$, $q \neq 1$.

b) $(1 + x)^n \geq 1 + nx$, for all $x \geq -1$, $n \in \mathbb{N}$.