

---

# Lecture 6: More Proofs

September 9, 2019

---

*Definition 1.* For a real number  $x$ ,  $|x|$  is defined as follows.

$$|x| = \begin{cases} x & \text{if } x \geq 0 \\ -x & \text{otherwise} \end{cases}$$

*Problem 1.* For real numbers  $x, y$ ,  $|xy| = |x||y|$ .

*Problem 2.* Prove that  $\sqrt{2}$  is irrational.

*Problem 3.* There are infinitely many primes.

*Problem 4.* There are irrational numbers  $x$  and  $y$  such that  $x^y$  is rational.