



Exercise 1. In this exercise we'll provide a different proof of our favorite fact, that $\sqrt{2}$ is irrational.

a. Assume $\sqrt{2}$ is rational, and let $p, q \in \mathbb{N}$ with $p/q = \sqrt{2}$. Show that $0 < p - q < q$.

b. With p, q as above, show that

$$\frac{2q - p}{p - q} = \sqrt{2}.$$

c. Use the Well-Ordering Principle and parts **a** and **b** to arrive at a contradiction.