Some Exercises on Induction, Problem 1 is for homework 1

1. Show the following theorem:

**Theorem 0.1** (Unique Factorization Theorem). *Every integer* $n > 1$ *can be represented as a product of prime factors in only one way, apart from the order of the factors.*

You may use the fact that if a prime number $p$ divides the product of two integers $ab$, then either $p$ divides $a$ or $p$ divides $b$.

2. [Optional] Show that every positive rational number can be written as a quotient of products of factorials of (not necessarily distinct) primes.