typst-theorems

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Contents

1. Introduction 1
2. Feature demonstration 1
  2.1. Proofs 1
  2.2. Suppressing numbering 2
  2.3. Limiting depth 2
  2.4. Custom formatting 2
  2.5. Labels and references 2
  2.6. Overriding `base` 3

1. Introduction

This document only includes the examples given in the manual; each one of these has been explained in full detail there.

2. Feature demonstration

Theorem 2.1 (Euclid): There are infinitely many primes.

Lemma 2.2: If n divides both x and y, it also divides $x - y$.

Corollary 2.2.1: If n divides two consecutive natural numbers, then $n = 1$.

2.1. Proofs

Proof of Theorem 2.1: Suppose to the contrary that $p_1, p_2, \ldots, p_n$ is a finite enumeration of all primes. Set $P = p_1 p_2 \ldots p_n$. Since $P + 1$ is not in our list, it cannot be prime. Thus, some prime factor p_j divides $P + 1$. Since p_j also divides P, it must divide the difference $(P + 1) - P = 1$, a contradiction. ■

Theorem 2.1.1: There are arbitrarily long stretches of composite numbers.

Proof: For any $n > 2$, consider

$$n! + 2, \quad n! + 3, \quad \ldots, \quad n! + n \qquad \blacksquare$$

2.2. Suppressing numbering

Example: The numbers 2, 3, and 17 are prime.

Lemma: The square of any even number is divisible by 4.

Lemma 2.2.1: The square of any odd number is one more than a multiple of 4.

Lemma 42: The square of any natural number cannot be two more than a multiple of 4.

2.3. Limiting depth

Definition 2.1 (Prime numbers): A natural number is called a *prime number* if it is greater than 1 and cannot be written as the product of two smaller natural numbers.

Definition 2.2 (Composite numbers): A natural number is called a *composite number* if it is greater than 1 and not prime.

Example 2.3.0.0.1: The numbers 4, 6, and 42 are composite.

2.4. Custom formatting

Lemma 2.4.1: All even natural numbers greater than 2 are composite.

Proof: Every even natural number n can be written as the product of the natural numbers 2 and $n/2$. When $n > 2$, both of these are smaller than 2 itself. $\square$

Notation (I) : The variable p is reserved for prime numbers.

Notation (II) for Reals: The variable x is reserved for real numbers.

Lem. 2.4.2: All multiples of 3 greater than 3 are composite.

2.5. Labels and references

Recall that there are infinitely many prime numbers via Theorem 2.1.

You can reference future environments too, like Cor. 2.5.1.1.

Lemma 2.5.1: All primes apart from 2 and 3 are of the form $6k \pm 1$.

You can modify the supplement and numbering to be used in references, like Lem. (2.5.1).

2.6. Overriding `base`

Remark 2.6.1: There are infinitely many composite numbers.

Corollary 2.5.1.1: All primes greater than 2 are odd.

Remark 2.5.1.1.1: Two is a *lone prime*.