Standard Template Document

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March 06, 2025

Preface

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Contents

1. Sample Title

목차 글꼴이 깨지는 이유는 알 수 없네요

Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magnam aliquam quaerat voluptatem. Ut enim aeque doleamus animo, cum corpore dolemus, fieri tamen permagna accessio potest, si aliquod aeternum et infinitum impendere malum nobis opinemur. Quod idem licet transferre in voluptatem, ut postea variari voluptas distinguique possit, augeri amplificarique non possit. At etiam Athenis, ut e patre audiebam facete et urbane Stoicos irridente, statua est in quo a nobis philosophia defensa et collaudata est, cum id, quod maxime placeat, facere possimus, omnis voluptas assumenda est, omnis dolor repellendus. Temporibus autem quibusdam et aut officiis debitis aut rerum necessitatibus saepe eveniet, ut et voluptates repudiandae sint et molestiae non recusandae. Itaque earum rerum defuturum, quas natura non depravata desiderat. Et quem ad me accedis, saluto: 'chaere,' inquam, 'Tite!' lictores, turma omnis chorusque: 'chaere, Tite!' hinc hostis mi Albucius, hinc inimicus. Sed iure Mucius. Ego autem mirari satis non queo unde hoc sit tam insolens domesticarum rerum fastidium. Non est omnino hic docendi locus; sed ita prorsus existimo, neque eum Torquatum, qui hoc primus cognomen invenerit, aut torquem illum hosti detraxisse, ut aliquam ex eo est consecutus? – Laudem et caritatem, quae sunt vitae sine metu degendae praesidia firmissima. – Filium morte multavit. – Si sine causa, nollem me ab eo delectari, quod ista Platonis, Aristoteli, Theophrasti orationis ornamenta neglexerit. Nam illud quidem physici, credere aliquid esse minimum, quod profecto numquam putavisset, si a Polyaeno, familiari suo, geometrica discere maluisset quam illum etiam ipsum dedocere. Sol Democrito magnus videtur, quippe homini erudito in geometriaque perfecto, huic pedalis fortasse; tantum enim esse omnino in nostris poetis aut inertissimae segnitiae est aut fastidii delicatissimi. Mihi quidem videtur, inermis ac nudus est. Tollit definitiones, nihil de dividendo ac partiendo docet, non quo ignorare vos arbitrer, sed ut.

The Schrödinger equation is like the following.

$$i\hbar\frac{\partial}{\partial t}\psi = \left\{-\frac{\hbar^2}{2m}\nabla^2+V(x)\right\}\psi$$

다람쥐 헌 쳇바퀴 타고파.

2. Functionality Test

어떤 것들이 가능한지 알아보자.

2.1. 새로운 수열 δ_n

위와 같이 제목 안에 수식을 넣을 수 있다.

2.2. 여러가지 문자

한글: 다람쥐 헌 쳇바퀴 타고파.
일본어: 私はガラスを食べられます。
중국 간체: 我爱北京的天安门
중국 번체: 我愛北京的天安門
키릴: Привет, мир. Сука Блять!
그리스 문자: Γειά σου, Κόσμε.
한자: 道吾善者는 是吾賊이오, 道吾惡者는 是吾師니라.

2.3. 표

VOLUME	PARAMETERS
$\pi h \frac{D^2 - d^2}{4}$	h: height D: outer radius d: inner radius
$\frac{\sqrt{2}}{12} a^3$	a: edge length

2.4. 수식

이렇게 $a^2 + b^2 = c^2$ 같은 인라인 수식을 쓸 수도 있고, 아래처럼 블록 수식을 쓸 수도 있다

$$E_\mathrm{k} = \frac{1}{2} m v^2 = \frac{p^2}{2m}$$

위 식은 라벨이 없지만,

$$\frac{\hat{p}^2}{2m} = \frac{\hbar^2}{2m} \frac{\partial^2}{\partial x^2} = \frac{\hbar^2}{2m} \nabla^2 \tag{1}$$

위 식은 라벨이 있다.

2.5. 그림

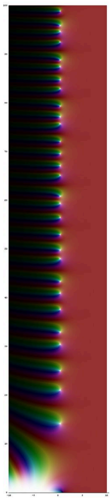

Figure 1: Riemann 제타(ζ) 함수의 그래프

2.6. 라벨

2.6.1. Table of Theorems

2.6.2. Basic Theorem Environments

Let's start with the most fundamental definition.

Definition 2.6.1

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.

Example. The numbers 2, 3, and 17 are prime. As proven in Corollary 2.6.2.1°, this list is far from complete! See Theorem 2.6.2° for the full proof.

Theorem 2.6.2 (Euclid's Theorem)

There are infinitely many prime numbers.

Proof. By contradiction: Suppose $p_1, p_2, \ldots, p_n$ is a finite enumeration of all primes. Let $P = p_1 p_2 \ldots p_n$. Since $P + 1$ is not in our list, it cannot be prime. Thus, some prime p_j divides $P + 1$. Since p_j also divides P, it must divide their difference $(P + 1) - P = 1$, a contradiction. □

Corollary 2.6.2.1

There is no largest prime number.

Lemma 2.6.3

There are infinitely many composite numbers.

2.6.3. Functions and Continuity

Theorem 2.6.4 (Continuity Theorem)

If a function f is differentiable at every point, then f is continuous.

Tip

Theorem 2.6.4° tells us that differentiability implies continuity, but not vice versa. For example, $f(x) = |x|$ is continuous but not differentiable at $x = 0$. For a deeper understanding of continuous functions, see Theorem 2.7.1° in the appendix.

2.6.4. Geometric Theorems

Theorem 2.6.5 (Pythagorean Theorem)

In a right triangle, the square of the hypotenuse equals the sum of squares of the other two sides: $x^2 + y^2 = z^2$

Important

Theorem 2.6.5° is one of the most fundamental and important theorems in plane geometry, bridging geometry and algebra.

Corollary 2.6.5.1

There exists no right triangle with sides measuring 3cm, 4cm, and 6cm. This directly follows from Theorem 2.6.5°.

Lemma 2.6.6

Given two line segments of lengths a and b, there exists a real number r such that $b = ra$.

2.6.5. Algebraic Structures

Definition 2.6.7 (Ring)

Let R be a non-empty set with two binary operations $+$ and $\cdot$, satisfying:
1. $(R, +)$ is an abelian group
2. $(R, \cdot)$ is a semigroup
3. The distributive laws hold

Then $(R, +, \cdot)$ is called a ring.

Proposition 2.6.8

Every field is a ring, but not every ring is a field. This concept builds upon Definition 2.6.7°.

Example. Consider Definition 2.6.7°. The ring of integers $\mathbb{Z}$ is not a field, as no elements except ± 1 have multiplicative inverses.

2.7. Theorion Appendices

2.7.1. Advanced Analysis

Theorem 2.7.1 (Maximum Value Theorem)

A continuous function on a closed interval must attain both a maximum and a minimum value.

Warning

Both conditions of this theorem are essential:
- The function must be continuous
- The domain must be a closed interval

2.7.2. Advanced Algebra Supplements

Axiom 2.7.2 (Group Axioms)

A group $(G, c \cdot)$ must satisfy:
1. Closure
2. Associativity
3. Identity element exists
4. Inverse elements exist

Postulate 2.7.3 (Fundamental Theorem of Algebra)

Every non-zero polynomial with complex coefficients has a complex root.

Remark

This theorem is also known as Gauss's theorem, as it was first rigorously proved by Gauss.

2.7.3. Common Problems and Solutions

Problem. Prove: For any integer $n > 1$, there exists a sequence of n consecutive composite numbers.

Solution. Consider the sequence: $n! + 2, n! + 3, \ldots, n! + n$

For any $2 \leq k \leq n$, $n! + k$ is divisible by k because: $n! + k = k\left(\frac{n!}{k} + 1\right)$

Thus, this forms a sequence of $n - 1$ consecutive composite numbers.

Exercise.
1. Prove: The twin prime conjecture remains unproven.
2. Try to explain why this problem is so difficult.

Conclusion. Number theory contains many unsolved problems that appear deceptively simple yet are profoundly complex.

2.7.4. Important Notes

> **Note**
>
> Remember that mathematical proofs should be both rigorous and clear. Clarity without rigor is insufficient, and rigor without clarity is ineffective.

> **Caution**
>
> When dealing with infinite series, always verify convergence before discussing other properties.

> Mathematics is the queen of sciences, and number theory is the queen of mathematics. — Gauss

Chapter Summary:
- We introduced basic number theory concepts
- Proved several important theorems
- Demonstrated different types of mathematical environments