FIRST ASSIGNMENT

STUDENT

1. Introduction

Fermat's Last Theorem says that

$$x^n + y^n = z^n \tag{1}$$

has no integer solution for $n > 2$. On the other hand, for $n = 2$ we obtain

$$x^2 + y^2 = z^2 \tag{2}$$

whose solutions are called Pythagoraen triples. We see that (2) is special case of (1).

More complicated equations

$$\text{Integrals} \qquad \int_a^b \sin(x)dx = -\cos(b) + \cos(a)$$

or

$$\text{even indefinite integrals} \int \frac{1}{x} dx = \ln(x)$$

The real numbers $\mathbb{R}$, or $\mathbf{R}$, the rationals $\mathbb{Q}$, etc.

Definition 1.1. A *vector space* over a field F is given by a set V which has the following structures:

(1) a map $+ : V \times V \to V$, called *addition*, making $(V, +)$ into an abelian group.
(2) a map $F \times V \to V : (\lambda, v) \mapsto \lambda v$ called *scalar multiplication*, satisfying $\lambda(\mu v) = (\lambda\mu)v$ and .....

Remark 1.2.

- A 2×2–matrix looks like
$$A = \begin{pmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{pmatrix}$$
- Continued fractions look like
$$\cfrac{1}{1 + \frac{1}{1 + \frac{1}{1 + \cdots}}}$$

Definition 1.3. The exponential map is given by the absolut converging series

$$\exp(z) = \sum_{k=0}^{\infty} \frac{z^k}{k!}$$

where $z \in \mathbb{C}$ is any complex number.

We then have:

Theorem 1.4 (Euler)**.**

$$e^{i\theta} = \cos(\theta) + i \sin(\theta)$$

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