lecture 2

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definition of e

1. As a **Limit**:

$$\begin{aligned} e &= \lim_{n\to\infty} \left(1+\frac{1}{n}\right)^n \\ &= \lim_{t\to 0} (1+t)^{\frac{1}{t}} \end{aligned} \tag{1}$$

2. As a *Sum*:

$$e = \sum_{n=0}^{\infty} \frac{1}{n!} \tag{2}$$

$$e = \sum_{t=1}^{\infty} \frac{1}{(t-1)!} \tag{3}$$

3. As a continued fraction

$$e = 2 + \cfrac{1}{1 + \cfrac{1}{2 + \cfrac{2}{3 + \cfrac{3}{4 + \cfrac{4}{5 + \ddots}}}}}$$

Equation 1 was really cool.
Equation 2 is same as 3

$$\begin{aligned} e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \frac{x^5}{5!} + \frac{x^6}{6!} + \frac{x^7}{7!} + \frac{x^8}{8!} \\ + \frac{x^9}{9!} + \frac{x^{10}}{10!} + \frac{x^{11}}{11!} + \frac{x^{12}}{12!} + \frac{x^{13}}{13!} + \frac{x^{14}}{14!} + \frac{x^{15}}{15!} + \frac{x^{16}}{16!} \end{aligned} \tag{4}$$

More tricks

Table 1: A simple Table

1	2	8	9
3	5000000000	90000000	0

I like table 1

Figure 1: Image display

figure 1 is a pokemon named pikachu.
tabular and includegraphics are actual code for both
table and images the table and figure is used to give caption and label to them
It creates a float object and latex try to find best place to fit that
to resolve this us the package float and add [H] as shown.

1 Theorem and Macros

Theorem 1.1. *sum of first n natural number is* $\frac{n(n+1)}{2}$

Proof. itemize

Note that,

$\sum_{i=1}^{n} i$ and $\sum_{i=1}^{n}(n-i+1)$

Both are equal adding these gives

$n(n+1)$

and then divide the equation by two to get the sum itemize

□

Corollary 1.1.1. *let* $m, n \in \mathbb{N}, m < n$ *then sum from* $m+1$ *to* n *is* $\frac{n(n+1)-m(m+1)}{2}$

Theorem 1.2. *in standard notation* $\mathbb{N} \subset \mathbb{Q} \subset \mathbb{R}$

Corollary 1.2.1. $\mathbb{N} \cap \mathbb{Q} = \mathbb{Q}$

Proof. as $\mathbb{N}$ is a subset of $\mathbb{Q}$ □

$$\begin{pmatrix} 34 & 56 & 34 \\ 76 & 54 & 45 \end{pmatrix}$$