$$\mathbb{C} = \mathbb{R} + i\mathbb{R}$$

$$\mathfrak{e} \Big\downarrow \text{diff}$$

$$\mathbb{C}^{\times} = \mathbb{R}_{>}\mathbb{T}$$

$$^{r+is}\mathfrak{e} = {}^{r}\mathfrak{e}\;{}^{is}\mathfrak{e} = {}^{r}\mathfrak{e}\;\underbrace{{}^{s}\mathfrak{c} + i\,{}^{s}\mathfrak{s}}$$

$$^{\mathbb{C}}\mathfrak{e} = \mathbb{C}^{\times} \text{ surj}$$

$$z \in \mathbb{C}^{\times} \Rightarrow \ulcorner z \urcorner > 0 \Rightarrow \bigvee_{r \in \mathbb{R}} \ulcorner z \urcorner = {}^{r}\mathfrak{e}$$

$$w = z/\ulcorner z \urcorner \in \mathbb{T} \Rightarrow \bigvee_{s \in \mathbb{R}} w = {}^{s}\mathfrak{c} + i\,{}^{s}\mathfrak{s} = {}^{is}\mathfrak{e} \Rightarrow z = \ulcorner z \urcorner w = {}^{r}\mathfrak{e}\;{}^{is}\mathfrak{e} = {}^{r+is}\mathfrak{e}$$

$$z \in \mathbb{C} \xrightarrow{\mathfrak{e}} \mathbb{C} \llcorner 0 \ni {}^{z}\mathfrak{e} = \sum_{n}^{\mathbb{N}} z^{\cancel{n}}$$

$$^{z}\mathfrak{e} = \sum_{n}^{\mathbb{N}} z^{\cancel{n}} \Rightarrow R = \infty$$

$$\mathbb{K} \xrightarrow[\text{diff}]{\mathfrak{e}} \mathbb{K}$$

$$\sum_{n}^{\mathbb{N}} \ulcorner z^{\cancel{n}} \urcorner \leqslant \sum_{n}^{\mathbb{N}} \ulcorner z \urcorner^{\cancel{n}} < \infty \Rightarrow \sum_{n}^{\mathbb{N}} z^{\cancel{n}} \in \mathbb{K}$$

$$\sum_{n}^{\mathbb{N}} z^{\not n} \Leftarrow \left(1+\frac{z}{n}\right)^{n}$$

$$\sum_{k\,\leqslant\, m} \overline{z^{\not m}} \leqslant \varepsilon/2 \Longrightarrow \sum_{m}^{0|n} z^{\not m} - \left(1+\frac{z}{n}\right)^{n} = \sum_{m}^{0|n} z^{\not m} - n!\sum_{m}^{0|n} 1^{n \not- m}\, \overbrace{z/n}^{\not m}$$

$$= \sum_{m}^{0|n} z^{\not m} \left(1 - \frac{n!}{(n-m)!n^{m}}\right) = \sum_{m}^{0|n} z^{\not m} \left(1 - \frac{n\,(n-1)\cdots(n-m+1)}{n^{m}}\right)$$

$$= \sum_{m}^{0|n} z^{\not m} \left(1 - \prod_{j}^{m}\left(1-\frac{j}{n}\right)\right) = \underbrace{\sum_{m}^{k|n} z^{\not m} \left(1 - \overset{\leqslant 1}{\prod_{j}^{m}\left(1-\frac{j}{n}\right)}\right)}_{|\cdot|\,\leqslant\,\varepsilon/2} + \sum_{m}^{k} z^{\not m} \left(1 - \underset{\leqslant\,\delta\,\Leftarrow\, n\,\rightsquigarrow\,\infty}{\prod_{j}^{m}\left(1-\frac{j}{n}\right)}\right) \leqslant \varepsilon$$

$${}^{z+w}\mathfrak{e} = {}^{z}\mathfrak{e}\;{}^{w}\mathfrak{e}$$

$${}^{z+w}\mathfrak{e} = \sum_{n}^{\mathbb{N}} \overbrace{z+w}^{\not n} \underset{\text{binomi}}{=} \sum_{n}^{\mathbb{N}}\sum_{m}^{0|n} z^{\not m}\, w^{n \not- m} \underset{\text{Fubini}}{=} \sum_{m}^{\mathbb{N}}\sum_{m}^{0|n} z^{\not m}\, w^{n \not- m}$$

$$\underset{n-m\,=\,k}{=} \sum_{m}^{\mathbb{N}}\sum_{k}^{\mathbb{N}} z^{\not m}\, w^{\not k} = \sum_{m}^{\mathbb{N}} z^{\not m} \sum_{k}^{\mathbb{N}} w^{\not k} = {}^{z}\mathfrak{e}\;{}^{w}\mathfrak{e}$$

$$\underline{\mathfrak{e}} = \mathfrak{e}$$

$${}^{z}\underline{\mathfrak{e}} = \sum_{1\,\leqslant\, n} \frac{n z^{n-1}}{n!} = \sum_{1\,\leqslant\, n} z^{n \not- 1} = {}^{z}\mathfrak{e}$$

$$ {}^{z+w}\mathfrak{e} = {}^{z}\mathfrak{e}\,{}^{w}\mathfrak{e} $$

$$ \partial_z\,{}^{z+w}\mathfrak{e}\,{}^{-z}\mathfrak{e} = {}^{z+w}\mathfrak{e}\,{}^{-z}\mathfrak{e} - {}^{z+w}\mathfrak{e}\,{}^{-z}\mathfrak{e} = 0 \Longrightarrow {}^{z+w}\mathfrak{e}\,{}^{-z}\mathfrak{e} = \text{ cst } = {}^{w}\mathfrak{e} $$

$$ {}^{z}\mathfrak{e}\,{}^{-z}\mathfrak{e} = {}^{0}\mathfrak{e} = 1 $$

$$ {}^{z}\mathfrak{e} \neq 0 $$

$$ {}^{o+z}\mathfrak{e} = \sum_{n}^{\mathbb{N}} z^{\cancel{n}}\,{}^{o}\mathfrak{e} = {}^{o}\mathfrak{e}\,{}^{z}\mathfrak{e} $$

$$ \partial^{n}\mathfrak{e} = \mathfrak{e} $$

$$ \ulcorner {}^{o+z}\mathfrak{e} - \sum_{n}^{m} z^{\cancel{n}}\partial_o^{n}\mathfrak{e} \urcorner = \ulcorner z^{\cancel{m}}\partial_w^{m}\mathfrak{e} \urcorner \leqslant \bigvee_{0|z} \ulcorner \overset{\cancel{m}}{z} \urcorner \ulcorner \mathfrak{e} \urcorner \leadsto 0 $$

$$ \ulcorner {}^{z}\mathfrak{e} - 1 \urcorner \leqslant {}^{\ulcorner z \urcorner}\mathfrak{e} - 1 \leqslant \ulcorner z \urcorner\,{}^{\ulcorner z \urcorner}\mathfrak{e} $$

$$ \ulcorner {}^{z}\mathfrak{e} - 1 \urcorner = \ulcorner \sum_{n>0} z^{\cancel{n}} \urcorner \leqslant \sum_{n>0} \ulcorner z^{\cancel{n}} \urcorner = {}^{\ulcorner z \urcorner}\mathfrak{e} - 1 \leqslant \sum_{n>0} \frac{\ulcorner z \urcorner^{n}}{(n-1)!} = \ulcorner z \urcorner\,{}^{\ulcorner z \urcorner}\mathfrak{e} $$