Ironic proofs

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Table des matières

Proof of homogeneity of the sinal function

Theorem

$-\sin(x) \equiv \sin(-x)$

Proof

1. We define :

$$sign(x) = + \qquad\qquad sign(-x) = -$$

2. We apply the **phonetic equivalence principle** of sin and $sign$:

$$\begin{aligned} -\sin(x) &= \sin(-x) \\ \therefore -sign(x) &= sign(-x) \quad \text{by phonetic equivalence} \\ \Rightarrow -(+) &= - \\ \Rightarrow - &= - \end{aligned}$$

$\therefore\ -\sin(x) \equiv \sin(-x)$

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Proof of equivalence of addition to multiplication in the definition of the factorial

Theorem

$$n! = \prod_{i=0}^{n-1}(n-i) \equiv \sum_{i=0}^{n-1}(n-i)$$

Proof

1. It is known that :

$$n! = \prod_{i=0}^{n-1}(n-i) = (n-0) \times (n-1) \times \cdots \times 1$$

2. We apply the **rotation property** of multiplication

$$\begin{aligned} n! = \prod_{i=0}^{n-1}(n-i) &= (n-0) \times (n-1) \times \dots \times 1 \\ &= (n-0) \overset{\curvearrowright}{+} (n-1) \overset{\curvearrowright}{+} \dots \overset{\curvearrowright}{+} 1 \\ &= (n-0) + (n-1) + \dots + 1 \\ &= \sum_{i=0}^{n-1}(n-i) \end{aligned}$$

$\therefore\ n! \equiv \sum_{i=0}^{n-1}(n-i)$

Examples of application

$$\begin{aligned} 3! &= \prod_{i=0}^{3-1}(3-i) = 3 \times 2 \times 1 = 6 \\ &\equiv \sum_{i=0}^{3-1} = 3 + 2 + 1 = 6 \end{aligned}$$

$$\begin{aligned} 1! &= \prod_{i=0}^{1-1} = 1 \\ &\equiv \sum_{i=0}^{1-1}(1-i) = 1 \end{aligned}$$

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Proof of Taylor Expansion

Proof

i. Taylor;
ii. T a y l o r;
iii. T a y l o r;
iv. T a y l o r;
v. T a y l o r;
vi. T a y l o r;
vii. T a y l o r;
viii. T a y l o r;
ix. T a y l o r;
x. T a y l o r;

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