P = NP: Proof by Halting Problem

Definition

A problem is incomputable if and only if it is equivalent to the halting problem.

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Point 1: Minimum Space Requirements

The scenario form is:

[Required space, time, solution space]

For any function of space or time, if they are less than the required space, the problem is incomputable. An incomputable function is expressed as:

[Space, time, n → ∞]

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Point 2: Contradiction of Incomputability in NP-Complete Problems with Polynomial Algorithms

For NP-complete problems:

[O(n^s), O(n^t), n → 2^n] ≠ [O(n^s), O(n^t), n → ∞]

Since the polynomial algorithm:

[O(n^s), O(n^t), n → 2^n]

is computable, this contradicts the assumption of incomputability.

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Point 3: Contradiction of Incomputability with Exponential Solution Space in Polynomial Algorithms

Even with an exponential solution space:

[O(n^s), O(n^t), n → 2^n]

the problem remains computable. Several polynomial algorithms exist that can handle exponential or super-exponential solution spaces, demonstrating that the problem is not incomputable.

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Conclusion

Since a polynomial-time algorithm with polynomial space and exponential solution space is computable, we conclude:

P = NP