# ON THE DIFFICULTY OF GENERATING ALL BINARY STRINGS OF COMPLEXITY LESS THAN N

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Abstract 72T–E101. Gregory J. Chaitin, Mario Bravo 249, Buenos Aires, Argentina. *On the difficulty of generating all binary strings of complexity less than n.* Preliminary report.

Complexity is taken in the information-theoretic sense, i.e. the complexity of something is the number of bits in the shortest program for computing it on the standard universal computer.

Let

$$\alpha(n) = \min \max(\text{the length of } P \text{ in bits, the time it takes } P \text{ to halt}),$$

where the minimum is taken over all programs $P$ whose output is the set of all binary strings of complexity less than $n$.

Let

$$\beta(n) = \max f(n),$$

where the maximum is taken over all number-theoretic functions $f$ of complexity less than $n$.

Let

$$\gamma(n) = \sum(\text{the length of } S),$$

where the sum is taken over all binary strings $S$ of complexity less than $n$.

Take $f \approx g$ to mean that there are $c$ and $c'$ such that for all $n$, $f(n) \leq g(n+c)$ and $g(n) \leq f(n+c')$.

*Theorem.* $\alpha \approx \beta \approx \gamma$.

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