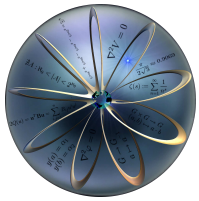

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invariance theorem

Canonical name	InvarianceTheorem
Date of creation	2013-03-22 13:43:54
Last modified on	2013-03-22 13:43:54
Owner	rspuzio (6075)
Last modified by	rspuzio (6075)
Numerical id	7
Author	rspuzio (6075)
Entry type	Theorem
Classification	msc 68Q30

The invariance theorem states that a universal Turing machine provides an optimal means of description, up to a constant. Formally, for every Turing machine M there exists a constant c such that for all binary strings x we have

$$C_U(x) \leq C_M(x) + c.$$

Here, C_U means the complexity with respect to the universal Turing machine and C_M means the complexity with respect to M.

This follows trivially from the definition of a universal Turing machine, taking $c = l(< M >)$ as the length of the encoding of M.

The invariance theorem holds likewise for prefix and conditional complexities.