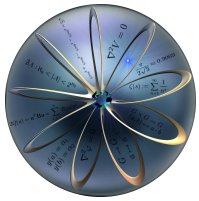

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binary Gray code

Canonical name	BinaryGrayCode
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Synonym	Gray code
Defines	cyclic Gray code

An n-bit binary *Gray code* is a non-repeating sequence of the integers from 0 to $2^n - 1$ inclusive such that the binary representation of each number in the sequence differs by exactly one bit from the binary representation of the previous number: that is, the Hamming distance between consecutive elements is 1. In addition, we also define a *cyclic Gray code* to be a Gray code where an extra condition is imposed: The last number in the sequence must differ by exactly one bit from the first number in the sequence.

For example, one 3-bit cyclic Gray code is:

$$000_2$$
$$010_2$$
$$011_2$$
$$001_2$$
$$101_2$$
$$111_2$$
$$110_2$$
$$100_2$$

There is a one-to-one correspondence between all possible n-bit Gray codes and all possible Hamiltonian cycles on an n-dimensional hypercube. (To see why this is so, imagine assigning a binary number to each vertex of a hypercube where an edge joins each pair of vertices that differ by exactly one bit.)