1.

1.
2. (move)
3.
4.

ICG 3
P-position N-position

P-position
P-position N-position
P-position
N-position
N-position P-position

P-position N-position

1.1.

Example 1.
n 1

“ Nim ” Pennies
Nim P-position (3,3) P P P-position (3,3) (0,3)(
(0,3) (0,0) (0,1) (0,2) (0,0) P-position (0,3) N-position P-position N-position (1,3) (1,1) P-position (1,1) (0,1) N-position (1,3) N-position (2,3) N-position (3,3) N-position P-position “ P-position ”
—— P-position DP Nim

2.

position 1. terminal position P-position 2. N-position P-position 3. P-position P-position

Theorem 1.
k $N_1, N_2, \ldots, N_k$

1.

2.

3.

Nim (a1,a2,...,ak) P-position `a1^a2^...^ak=0` ^ (xor)

Proof. (*Proof of Theorem 1*) 1 `0^0^0...^0=0` P-position
2 `a1^a2^...^ak=s!=0` N-position ai s 1 `a1^a2^...^ak` s `a1^a2^...^ak=100101` ai
position

3 `a1^a2^...^ak=0` `ai-->ai'` `ai'=ai^s` s `ai'<ai` `a1^a2^...^ai-1^(ai^s)^ai+1^...^ak=a1^a2^`
position □