Task 6. «Boolean cubes»

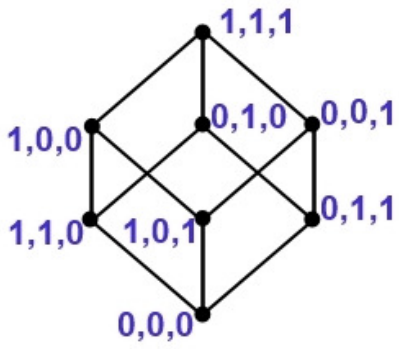
Alice has two cubes E_1 and E_2 of dimension 3 (see the picture below). Their vertices have labels consisting of three integers; for example, (1,0,1) consists of integers 1, 0, 1. Consider an operation A that can be applied for a cube. The operation A contains three steps:

Step 1. Take an arbitrary edge of the cube;

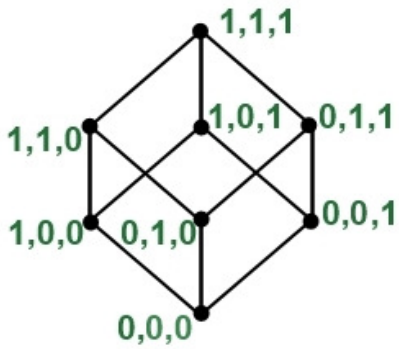
Step 2. Take the number a equal to 1 or -1;

Step 3. Add a to an arbitrary position of the first vertex of the chosen edge. Add a to an arbitrary position of the second vertex of the edge.

Is it possible to get the cube E_2 from the cube E_1 by applying the operation A as many times as necessary? Give your arguments.



The cube E_1



The cube E_2

An example of applying an operation. Step 1. Take the edge $((1,0,0);(1,1,0))$. Step 2. Let $a=-1$. Step 3. For the vertex $(1,0,0)$ we choose position 2 and for the vertex $(1,1,0)$ we choose position 1; after adding the edge $((1,0,0);(1,1,0))$ becomes $((1,-1,0);(0,1,0))$.