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## Permutations and cycles (1)

P93873\_en

Examen parcial d'Algorísmia, FME (2017-11-06)

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Write a program to print all the permutations of  $\{1, \dots, n\}$  with exactly  $k$  cycles, where  $1 \leq k \leq n$ . For exemple, consider the permutation  $(4, 3, 2, 5, 1, 7, 6)$ . At position 1 there is a 4, at position 4 there is a 5, and at position 5 there is a 1. Therefore, one of the cycles is  $1 \rightarrow 4 \rightarrow 5 \rightarrow 1$ . The other two cycles are  $2 \rightarrow 3 \rightarrow 2$  and  $6 \rightarrow 7 \rightarrow 6$ . The permutation  $(3, 2, 1)$  has the two cycles  $1 \rightarrow 3 \rightarrow 1$  and  $2 \rightarrow 2$ , and the permutation  $(3, 4, 5, 6, 7, 1, 2)$  only has the cycle  $1 \rightarrow 3 \rightarrow 5 \rightarrow 7 \rightarrow 2 \rightarrow 4 \rightarrow 6 \rightarrow 1$ .

### Input

Input consists of  $n$  and  $k$ , with  $1 \leq k \leq n$ .

### Output

Print all the permutations of  $\{1, \dots, n\}$  with  $k$  cycles.

### Information about the checker

You can print the solutions to this exercise in any order.

### Hint

A possible program does not build the permutations consecutively from left to right, but jumping over the solution, using a function

```
void f(int i, int ini, int cells, int cycles);
```

where  $i$  is the next cell to fill,  $ini$  is where the current cycle—still to be closed—starts,  $cells$  is the number of cells still free, and  $cycles$  is the number of cycles yet to be created.

### Sample input 1

3 1

### Sample output 1

(2, 3, 1)  
(3, 1, 2)

### Sample input 2

3 2

### Sample output 2

(2, 1, 3)  
(1, 3, 2)  
(3, 2, 1)

### Sample input 3

3 3

### Sample output 3

(1, 2, 3)

## **Problem information**

Author : Enric Rodríguez

Translator : Salvador Roura

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