



Bilkent University  
Department of Mathematics

## PROBLEM OF THE MONTH

**Term:** February 2020

There are  $55!$  empty boxes numbered 1 to  $55!$ . In each step we choose the empty box with minimal number, put one ball into it and after that from each box with number less than the number of chosen box (if any) we transfer one ball to the chosen one. Determine the number of non-empty box with minimal number and the amount of balls in it after  $55!$  steps.

*Note:* The number of balls in boxes numbered 1,2,3,4,5 after  $k$  steps for  $k = 1, 2, \dots, 7$  is given below:

1,0,0,0,0,...  
0,2,0,0,0,...  
1,2,0,0,0,...  
0,1,3,0,0,...  
1,1,3,0,0,...  
0,0,2,4,0,...  
1,0,2,4,0,...