

Name \_\_\_\_\_ ID \_\_\_\_\_

**Activity 7-2 (20 Sep 2018)**

4. How many sorted lists of integer of length  $k$  consisting only integers from 1 to  $n$  are there? (Note that each integer can appear many times in the list. For example, when  $k = 2$  and  $n = 3$ , there are 6 of them (i.e.: 1,1; 2,2; 3,3; 1,2; 1,3; and 2,3)).

5. (LPV-3.8.8) Prove the following identity

$$\sum_{k=0}^n \binom{n}{k} \binom{k}{m} = \binom{n}{m} 2^{n-m}$$

6. In a village, there are  $n$  houses built along a single road. They plan to plant gardens in front of the houses; therefore they have to choose a set of houses to host the gardens. Since they do not want to plant too many gardens, they do not want to have two gardens on consecutive houses. In how many ways can they choose a set of houses such that no two consecutive houses are in the set? (It is possible that, in the end, they do not plant any garden at all.)

*For example, if we have 3 houses these are the 5 ways to choose houses. (\* is chosen; o is not) The first example does not choose any houses.*

1	2	3
o	o	o
*	o	o
*	o	*
o	*	o
o	o	*