

COMP 182: Algorithmic Thinking

14 January 2014

1 Sets, subsets, and permutations

1. Consider the set $A = \{1, 2, 3, 4\}$.
 - (a) How many subsets of A of size 2 are there?
 - (b) How many subsets of A are there?
 - (c) How many permutations of the elements of A are there?
2. Now, assume the set A has n elements.
 - (a) How many subsets of A of size k (where $0 \leq k \leq n$) are there?
 - (b) How many subsets of A are there?
 - (c) How many permutations of the elements of A are there?

2 What is the value of k ?

What value does Algorithm **PrintK** print upon termination?

Algorithm 1: PrintK

Input: Integers n_1, n_2, \dots, n_m each of which is ≥ 1 .

Output: None.

$k \leftarrow 0$;

for $i_1 \leftarrow 1$ **to** n_1 **do**

for $i_2 \leftarrow 1$ **to** n_2 **do**

 .

 .

 .

for $i_m \leftarrow 1$ **to** n_m **do**

$k \leftarrow k + 1$;

Print k ;

3 Hello World!... a gazillion times

Consider the set $A = \{1, 2, 3, \dots, n\}$. How many times does Algorithm **HelloWorld!** print Hello World!?

Algorithm 2: HelloWorld!

Input: Set $A = \{1, 2, 3, \dots, n\}$ for some integer $n \geq 1$.

Output: None.

$k \leftarrow 0$;

while $k \leq |A|$ **do**

foreach *subset B of A of size k* **do**

foreach *permutation of the elements of B* **do**

Print Hello World!;

$k \leftarrow k + 1$;
