SfwrEng/CompSci 2S03 Fall 2015
Homework 3

You are to develop 3 Java programs that implement the following using recursive methods:

- **(Binomial coefficents)** The recursive formula for computing the Binomial Coefficients is the following:

$$\binom{n}{k} = \begin{cases} \binom{n-1}{k-1} + \binom{n-1}{k} & \text{if } 1 \leq k \leq n-1 \\ 1 & \text{if } n = k \text{ or } k = 0. \end{cases}$$

- **(Non-contiguius substrings)** A non-contiguous substring of String s is a sequence of $k \geq 0$ characters in s, in the order in which they occur in s. For instance, the sets of all non-contiguous substrings of "*abcd*" are $\{a, cd\}$, $\{ab, d\}$, $\{a, c\}$, $\{a, d\}$, $\{b, d\}$.

- **(The subset sum problem)** Given a set of non-negative integers, and a value *sum*, the goal is to identify all subsets whose sum of elements is equal to *sun*. For example, if the set of non-negative integers is $\{3, 34, 4, 12, 5, 2\}$ and $sum = 9$, then answer is $\{4, 5\}$ and $\{4, 2, 3\}$.

Deliverable
Three .java source files:

- `HWK3_1_MacID.java`. This file implements Binomial coefficients, where the first input is n and the second input is k. For example:

```
$java HWK3_1_borzoo 4 2


6
```

- `HWK3_2_MacID.java`. This file implements Non-contiguius substrings. For example:

```
$java HWK3_2_borzoo 1234


{1, 34}
{12, 4}
```

```
{1, 3}
{1, 4}
{2, 4}
```

- `HWK3_3_MacID.java`. This file implements subset sum. For example:

  ```
  $java HWK3_3_borzoo 3 34 4 12 5 2 9

  {4, 5}
  {4, 2, 3}
  ```

  where the last input indicates the sum.

If your program does not compile, you will receive 0. Your file must be submitted by **8:30am on Monday, October 12** on Avenue to Learn.

Documentation
Your program must be commented properly: each section of the code as well as each line.

Format
Also, you should add the following to the beginning of your source java file:

```
/*
Name:  [Your full name (no nicknames or chosen names)]
MacID: [Your MacID]
Student Number:  [Your student number]
Description:  [This is an informative excerpt about this file.]
*/
```

Failure in meeting this format and file naming convention will result in 0 credit.