## **INFSCI 0017 – Fundamentals of Object-Oriented Programming (Fall 2018)**

## **Lab 10**

Don’t forget - **“In order to understand recursion, one must first understand recursion”**

## Attribution

Based on P. Conrad’s “Sample Recursion Problem” - <http://www1.udel.edu/CIS/181/pconrad/05S/examples/recursion/recursion.problems.html>

http://www.techiedelight.com/find-distinct-combinations-of-given-length/

## Topics Reviewed

1. Recursion

## Grading and Submission

You are to write a complete Java program that meets the requirements outlined in the Lab 10 Tasks section.

Once you have completed the program, you should demonstrate your program for your Lab TA.

There will be 6 points for this lab, broken down in the following way:

1. Each of the 4 required methods is worth 1 point.

Note that if your program does not compile, the TA will not grade it.

## Lab 10 Tasks

**Task 1**: Write a recursive function with the following signature that returns the sum of the digits of an integer.

int sumOfDigits(int x);

* If x is 234, the function should return 2 + 3 + 4, that is, 9.
* If x is 12, the function should return 1 + 2, which is 3.
* If x is 39, the function should return 12.
* If x is negative, ignore the minus sign. For example, -12 and 12 both return 3.
* Hints:
  + The base case is a number between 0 and 9.
  + If x is negative, just multiply it by -1 or take an absolute value as soon as you enter the function.
  + For the recursive call, consider how computing the values x/10 and x%10 might be useful.

**Task 2**: Write a recursive function (DO NOT USE LOOPS) that prints all the elements of an array of integers, one per line. The parameters to the function should be int a[], and int size.

void printArrayElements(int a[], int size)

**Task 3**: Given an array of integers, find all distinct combinations of given length.

For example, given an input = {1, 2, 3} and k = 2 (combinations of 2 elements), the output should be {1, 2}, {1, 3}, {2, 3}.

If the input array is {1, 1, 2} and k = 2 the output should be {1, 1}, {1, 2}

* You must use recursion to solve this problem.
* Hint: add each element in the output and recurse for remaining elements with one less element.
* To avoid printing permutations, each combination will be constructed in same order as array elements.
* If combination of given size is found, we print it