CSC 180, Lab #7
Fall 2021

Directions: Turn in a hard copy of this assignment, with your answers written on this or another sheet of paper, as well as the completed Jupyter Notebook that goes with this lab.

1. In class, we learned that a formula for adding the integers between 1 and *n* is given by the following: $n(n+1)/2$. Using this formula [5 points]

    a. Find the sum of the integers between 1 and 50

    b. Find the sum of the integers between 1 and 70

2. The code below contains two algorithms for determining whether a word is in a list of words [9 points]

```
set wordFound to False
for w in words :
    if w == word :
        set word_found to True

if wordFound == True :
 print 'word found!'
```

   Assume that the length of the word list is *n*.

a) Assuming that the word is in the list, how many operations are required by the algorithm? Note: Count the following as single operations: assignment, comparison, and printing; the statement *for w in words* should count as a <u>two</u> operations, which is repeated *n* times.

b) What is the order of magnitude of this algorithm, using Big Theta notation?

c) What is the space requirement for this algorithm (this includes the list, which is *n*)?

3. Consider the list containing 3, 0, 1, 0, and 7, and complete the table below to specify the values of *position*, *num_valid* and the list after each iteration of the *while* loop in the *shuffle left* algorithm. [6 points]

	position	num_valid	List				
Original list	0	5	3	0	1	0	7
After iteration 1	1						
After iteration 2	1						
After iteration 3	2						
After iteration 4	2						
After iteration 5 (final)	3						

4. Consider the list containing 3, 0, 1, 0, and 7, and complete the table below to specify the value of the *copyList* after each iteration of *for* loop in the *copyOver* algorithm. [6 points]

copyList	-	-	-
After iteration 1			
After iteration 2			
After iteration 3			
After iteration 4			
After iteraton 5			

5. Consider the list containing 3, 0, 1, 0, and 7, and complete the table below to specify the values of *left*, *right*, *num_valid*, and the *list* after of the *copyList* after each iteration of the *while* loop in the *converging pointers* algorithm. [6 points]

	Left	Right	num_valid	List				
Original list	0	4	5	3	0	1	0	7
After iteration 1								
After iteration 2								
After iteration 3								
After iteration 4 (final)								

After the final iteration, number[left] is not valid, so *num_valid* is decreased by 1. The algorithm is now complete. There are 3 valid elements and the first 3 elements of the list should be 3, 7, and 1.