## CSCI 140 PA 5 Submission

## Due Date:4/2/2025 Late (date and time):\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

## Name(s):Ean Zheng

Exercise 1 – 6.30 LAB: Count characters – functions

Exercise 2 – 6.41 LAB: Subtracting list elements from max - functions  
Exercise 3 – 6.43 LAB: Word frequencies – functions (classic mode only)  
Exercise 4 – Large Integers version 2 – more points for this exercise  
Modify your previous version to add two large integers and output the result if it is valid.  
You must utilize functions and here are the three required functions: convert an  
operand as string to an int array or an int vector, add valid operands (two big integers as  
two int arrays or two int vectors, one int array or an int vector as result, return true for  
valid operation and return false for overflow), and output one big integer in required  
format (big integer as one int array or an int vector). Think about the best way to set up  
these functions. Use a sentinel loop to stop the input where 0 % 0 is the sentinel value.  
Pseudocode is not required, but feel free to use it, especially the add function. Follow the  
interface below and you must try the following test cases:  
Enter an expression --> 1234 + 72<Enter>  
1234 + 72 = 1306  
Enter an expression --> 987654321 + 123456789<Enter>  
987654321 + 123456789 = 1111111110  
// 24 digits + 1 digit = 25 digits (1 and 24 zeros)  
Enter an expression --> 999999999999999999999999 + 1<Enter>  
999999999999999999999999 + 1 = 1000000000000000000000000  
// 25 digits + 1 digit = overflow  
Enter an expression --> 9999999999999999999999999 + 1<Enter>  
9999999999999999999999999 + 1 = overflow  
// 26 digits + 3 digits = invalid operand(s)  
Enter an expression --> 99999999999999999999012345 + 123<Enter>  
Invalid operand(s)

// 3 digits + 27 digits = invalid operand(s)  
Enter an expression --> 123 + 999999999999999999990123456<Enter>  
Invalid operand(s)  
Enter an expression --> 0 % 0<Enter>  
Thank you for using my program.  
Question 1: List some good reasons for creating and using functions in C++ programs.  
Question 2: Why is it not a good idea to output a calculated result inside a calculated  
function that returns the calculated result?  
Extra Credit (2 points): Modify Exercise 4 so you can also perform subtraction with  
large number as well by adding a function sub (subtracting one big integer from a big  
integer as two int arrays, one int array as result, return true for valid operation, and return  
false when first operand is less than second operand). You can submit just this version,  
but make sure to show test cases for both addition and subtraction. Follow the interface  
below and you must try the following test cases:  
Enter an expression --> 1234 - 72<Enter>  
1234 - 72 = 1162  
Enter an expression --> 72 - 1234<Enter>  
72 - 1234 = result is negative  
Enter an expression --> 100 - 105<Enter>  
100 - 105 = result is negative  
Enter an expression --> 987654321 - 123456789<Enter>  
987654321 - 123456789 = 864197532  
Enter an expression --> 12345 - 12345<Enter>  
12345 - 12345 = 0  
// 25 digits - 1 digit = 25 digits  
Enter an expression --> 9999999999999999999999999 - 1<Enter>  
9999999999999999999999999 - 1 = 9999999999999999999999998  
Enter an expression --> 0 % 0<Enter>  
Thank you for using my program.  
Fill out and turn in the PA submission file with this lab (save as PDF format).