CSC530, Data Structures, instructor: Dr. Zhen Jiang
Project 1 assignment (Part A—Counter control loop: 10x5 = 50 points)

Submit via D2L. Late submissions are not acceptable.
Evaluation: You need to answer all questions and finish each step. Make the answers consistent with your program. You must also print out your code for the check. Array CANNOT be used!

Sample in class: Calculate the result 1+3+5+…+99
Step 1 (1 pt): What’s the repetition body you found (explain it in you own words as simple as precise)?
Addition

Step 2a (1 pt): What do you expect the computer do at the first iteration (or what’s the format of this body when you first repeat it)?
1+3

Step 2b (1 pt): What do you expect the computer do at the second iteration? (or what’s the format of this body when you secondly repeat it):
--- Pay attention on how to reuse the result from the above step. If necessary, rewrite the previous iteration.
total = 1 + 3
total = total + 5

Step 2c (1pt): What do you expect the computer do at the third iteration?
total = total + 7

Step 3a (1pt): What do you expect the computer do at the jth iteration?
total = total + 2*j+1 // to make sure the entire program is possible to develop

Step 3b (1 pt): What’s general format of this repetition body for all above repeated steps?
Total = total + □

Step 4 (1 pt): We know it is counter control loop! But how many times does the iteration body get repeated?
49

Step 5a (1 pt): What’s the condition, c < 49

Step 6a (1 pt): What’s the initialization required besides “c = 0”?
total =1

Final verification (1 pt): What’s the program (need to realize the body by the relation between □ and c)?
total =1;
c = 0;
while (c < 49){
total = total + 2*c+3;
c++;
}

1. Calculate the result 1+2+3+4+5+6+…+99.
Do all the steps in the above sample.

2. Calculate the result 1+1/2+1/3+1/4+1/5+… + 1/99.
Do all the steps in the above sample.

3. Calculate the result 1+2+4+8+16+32+…+4096.
Do all the steps in the above sample.

4. Calculate the result 1/i+2/(i-1)+3/(i-2)+…+(i-1)/2+i/1.
Do all the steps in the above sample.

5. Find the largest number of 10 input integer numbers which can be negative (using cin>>, array is not allowed to use).
Do all the steps in the above sample.
Followings are some samples to illustrate the necessity of using our 6 step development procedure:

Is this a counter-control loop?

What is the first iteration?
\[
\text{total} = 1 + 3
\]

What is the second iteration?
\[
\text{total} = \text{total} + 5
\]

What is the third iteration?
\[
\text{total} = \text{total} + 7
\]

What is the general format? Does it make sense?
\[
\text{Total} = \text{total} + \Box = \Box + 1
\]

How many times?
50!

Is this a counter-control loop?

What is the first iteration?
\[
\text{total} = 0 + 1
\]

What is the second iteration?
\[
\text{total} = \text{total} + 3
\]

What is the third iteration?
\[
\text{total} = \text{total} + 5
\]

What is the general format? Does it make sense?
\[
\text{Total} = \text{total} + \Box = \Box + 1
\]

How many times?
49!

Is this a counter-control loop?

What is the first iteration?
\[
\text{total} = 0 + 1
\]

What is the second iteration?
\[
\text{total} = \text{total} + 3
\]

What is the third iteration?
\[
\text{total} = \text{total} + 3
\]

What is the general format? Does it make sense?
\[
\text{Total} = \text{total} + \Box = \Box + 1
\]

How many times?
50
Is this a counter-control loop?

What is the first iteration?
\[
\text{total} = 3 + 1
\]

What is the second iteration?
\[
\text{total} = \text{total} + 3
\]

What is the third iteration?
\[
\text{total} = \text{total} + 5
\]

What is the general format? Does it make sense?
\[
\text{Total} = \text{total} + \Box \\
\Box = \Box + 1
\]

How many times?
50

What’s the initialization required besides “c = 0”
\[
\text{total} = 0!
\]