Name: _____

Score: _____ / _____

Part 1

What is the purpose of cache? Why do we use cache?

Answer Point Value: 50.0 points
Model Short Answer: --------

Here are the different levels of cache:

- registers

- L1 cache

- L2 cache

- RAM

- Hard Disk

Most frequently used items in memory are stored in ____ while least frequently used items are left on the ____. This allows us to retrieve frequent items more quickly. There is a tradeoff in using different levels of cache. When using registers, L1 cache, or L2 cache, accessing data that is stored there is (fast/slow) ____, but it is also (cheap/expensive) ____. Likewise, when using the hard disk, accessing data that is stored there is (fast/slow) ____, but it is also (cheap/expensive) ____.

Answer Point Value: 30.0 points
Answer Key: registers, hard disk, fast, expensive, slow, cheap

Heap vs. Stack:

The stack starts at (high/low) ____ memory addresses and grows (up/down) ____, while the heap starts at (high/low) ____ memory addresses and grows (up/down) ____.

Suppose we wanted to add all of the numbers from 0 to 100. In C++, it would be very time-consuming to do:

int sum = 0 + 1 + 2 + 3 + 4 + 5 + . . . ;

all the way up to 100. Instead, a while-loop would be much more efficient. Take a look at the code below:

int sum = 0;   // sum is a variable that we want to store the sum of the numbers in

int num = 0;   // num is the current number that we are adding to sum

while (num <= 100) {   // while num is between 0 and 100

    sum = sum + num;   // add num to sum

}

cout <<sum <<endl;   // print the final sum at the end

Answer the following questions:

(a [40pts]) The variable "num" is not being incremented. Is this a problem? What happens when we try to run this code?

(b [30pts]) Write one line of code that we can add to the while-loop so it will be correct. (Or write "none" if there is no problem with the while-loop.)

(c [10pts]) What gets printed out at the end?

Answer Point Value: 0.0 points
Model Short Answer: --------