3.2P - The Stack and Heap

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Task 3.2P Answer Sheet

Name:
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1. In 2.2P, how many Counter objects were created?

   2 Counter Objects + 1 object that has a reference to the first object

2. Variables declared without the "new" keyword are different to the objects created when we call "new". Referring to the main method in task 2.2P, what is the relationship between the variables initialised with and without the "new" keyword?

The variables declared with the new keyword will create a new object of the class specified whereas variables declared without the new keyword will include references to the objects.

3. In 2.2P, explain why resetting the counter in myCounters[2] also changed the value of the counter in myCounters[0].

   Resetting the counter in myCounters[2] also changed the value of the counter in myCounters[0] because they contain references to the same object. Thus, any methods applied to 1 counter will also apply to other.

4. The key difference between memory on the heap and memory on the stack is that the heap holds "dynamically allocated memory". What does this mean? In your answer, focus on the size and lifetime of the allocations.

Dynamically allocated memory means storing memory in the heap which means there are no restrictions to the allocated and deallocation of memory. Memory can be allocated and deallocated at any time and is not dependent on the run time. This makes it more complicated to keep track of what is being allocated.

5. Are objects allocated on the heap or the stack? What about local variables?

Objects are allocated on the heap while local variables are allocated on the stack.

6. What does the new() method do when called for a particular class, and what does it return?

When the new method is called for a particular class, it allocates enough space for the data members of the class which resides in the heap.

The new method returns an instance of the particular class.

7. Assuming the class Counter exists in my project, if I wrote the code "Counter myCounter;" (note there is no "="), what value would myCounter have? Why?

myCounter will have a null value. The code Counter myCounter will allocate enough space in the stack for a reference to an object of class Counter and that's all. It will hold values of the objects data members after the new method is called after the = sign.

8. Based on the code you wrote in task 2.2P, draw a diagram showing the locations of the variables and objects in main and their relationships to one another.

Stack	Heap

Main

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MyCounters [ ]

myCounters [0]

myCounters [1]

myCounters[2]

Counter 1
_Count
_Name

Counter 2
_Count
_Name