Data Structures - Spring 2021

Homework Assignment 01

Due: February 8, 2021 @ 6am uploaded to Canvas
Total Possible Points: 50

Submission Checklist:

- Are you submitting a PDF?
- Is your name somewhere **inside** the document you are submitting?
- Does the name of the PDF file match the format of *lastname*-hw00.pdf?
- Are any diagrams included in your submission created in a computer-based drawing application (as compared to hand-drawn and photoed using your phone)?
- Is all the code you include in a fixed point font such as Courier New or Fira Mono?

To complete this assignment, you'll need to make a copy in your own Google Drive account or download the file as a MS Word Document. Both of these can be accomplished from the File menu.

1. What member functions must be included in a class to satisfy the rule-of-3? [5 points]

2. Under what circumstances must the rule-of-3 be taken into consideration? [5 points]

3. Use the c-string array provided to determine the output of the statements that follow. [1 pt each]

```
char data[6][15] = {"Coke", "Pepsi", "DrPepper", "Sprite", "7up", "DietCoke"};
```

a.
```
cout << data[3];
```

b.
```
cout << *data[1];
```

c.
```
cout << *(data + 2);
```

d.
```
cout << data[5] + 2;
```

e.
```
cout << *(*(data + 4) + 1);
```

4. Draw a memory diagram for the following code at the point indicated. [7 points]

```
void foo(int a, int& b) {
  a = 10;
  b = a + 1;
  int* dyn = new int[5];
  //draw state of memory at this point in execution
}

int main() {
  int val [4] = {15, 20, 25, 30};
  int* p = val;
  int* q = val + 2;
  *q = *p;
  p++;
  foo(*q, *p);
  return 0;
}
```

5. Draw a memory diagram for the following code at the point indicated. [8 points]

```
void myFunction(int * myPtr)
{
	int* x = myPtr + 1;
	x[2] = 10;
	myPtr = new int[5];
	for (int i = 0; i < 5; ++i)
	myPtr[i] = x[0] + i + 3;
	//Draw state of memory here.

}

int main ()
{

	int* data = new int[6];
	data[0] = -2;
	for (int i = 1; i < 6; i++)
	data[i] = *(data + i - 1) + 2;

	*data = 10;
	int* temp = data;

	myFunction(data);

	return 0;
}
```

[# 6 - 9: 5 pts each]

6. Declare an array of pointers to integers on the stack. The length of the array should be 10 and it should be named dataPtrs.

7. Using the array you declared in question 1, for each of the pointers, dynamically allocate an array of integers for it to point to. The length of the int arrays should be equal to the index in the array of pointers + 8.

8. For the following block of code, write the statements necessary to properly deallocate memory.

```
char* names[4];
names[0] = new char[8];
names[1] = new char[6];
names[2] = new char[10];
names[3] = new char[16];
```

9. Dynamically allocate an array of pointers to integers of length 15. The name of the pointer to the array should be arrPtr.