Midterm Exam

Programming Workshop 2 (CSCI 1061U)

University of Ontario Institute of Technology

March 6, 2018

Total time: 50 minutes

Family name: _____

Given names: _____

Student number: _____

Question	Marks
1	_____ /2
2	_____ /2
3	_____ /2
4	_____ /2
5	_____ /2
6	_____ /6
7	_____ /6
8	_____ /4
Total	_____ /26

Instructions

- Please write in pen.
- Be tidy and neat.
- This exam sheet contains a total of 6 pages.

Written Part

Question 1

Fix the function `some_func()` in the following code to produce the output given below.

```
#include <iostream>
using namespace std;

void some_func() // TO DO
{
    int i;

    cout << "This is the " << i << "th call of this function." << endl;
}

int main()
{
    for (int i=0; i<3; ++i) some_func();

    return 0;
}
```

Output

```
This is the 0th call of this function.
This is the 1th call of this function.
This is the 2th call of this function.
```

Question 2

Provide the copy constructor for this class

```
class vec2 {
public:
  double x;
  double y;

public:

  vec2(): x(0), y(0) {} // Default constructor

  // TO DO: please provide copy constructor

  ---------------------------------------------------------------------------

  ---------------------------------------------------------------------------

  ---------------------------------------------------------------------------

  ---------------------------------------------------------------------------

  ---------------------------------------------------------------------------
  }
};
```

Question 3

Explain the difference between `'x'` and `"x"` when used as constants in C++. Describe the memory representation of both values.

Question 4

Circle the bug(s) in the following code.

```
#include <iostream>
using namespace std;

int main()
{

  int a[]=(1,2,3,4,5);

  for (int i=0; i<=5; ++i) {

    cout << "a[" << i << "] = " << a[i] << endl;

  }

  return 0;
}
```

Question 5

Write down the output of the following piece of code.

```
#include <iostream>
using namespace std;

int increment(int n)
{
  return n + 1;
}

int main()
{
  int n=0;
  for (int i=0; i<3; ++i) {
    increment(n);
  }
  cout << "n = " << n << endl;
  return 0;
}
```

Output

Question 6

You are allowed to use a 1D array `arr` to store an $m \times n$ matrix M. This matrix has m rows and n columns. In order to store entries of matrix M, array `arr` has $m \times n$ slots. Complete the following function `get(int* arr, int r, int c)` that returns the value stored at row r and column c of the matrix.

```
int get(int* arr, int r, int j)
{
    int val = 0;

    ------------------------------------------------

    ------------------------------------------------

    ------------------------------------------------

    ------------------------------------------------

    ------------------------------------------------

    return val;
}
```

Question 7

Complete the following code that updates an array to contain its *commulative sum*. E.g., say an array is 1, 3, 5. Then the array will be modified to 1, 4, 9.

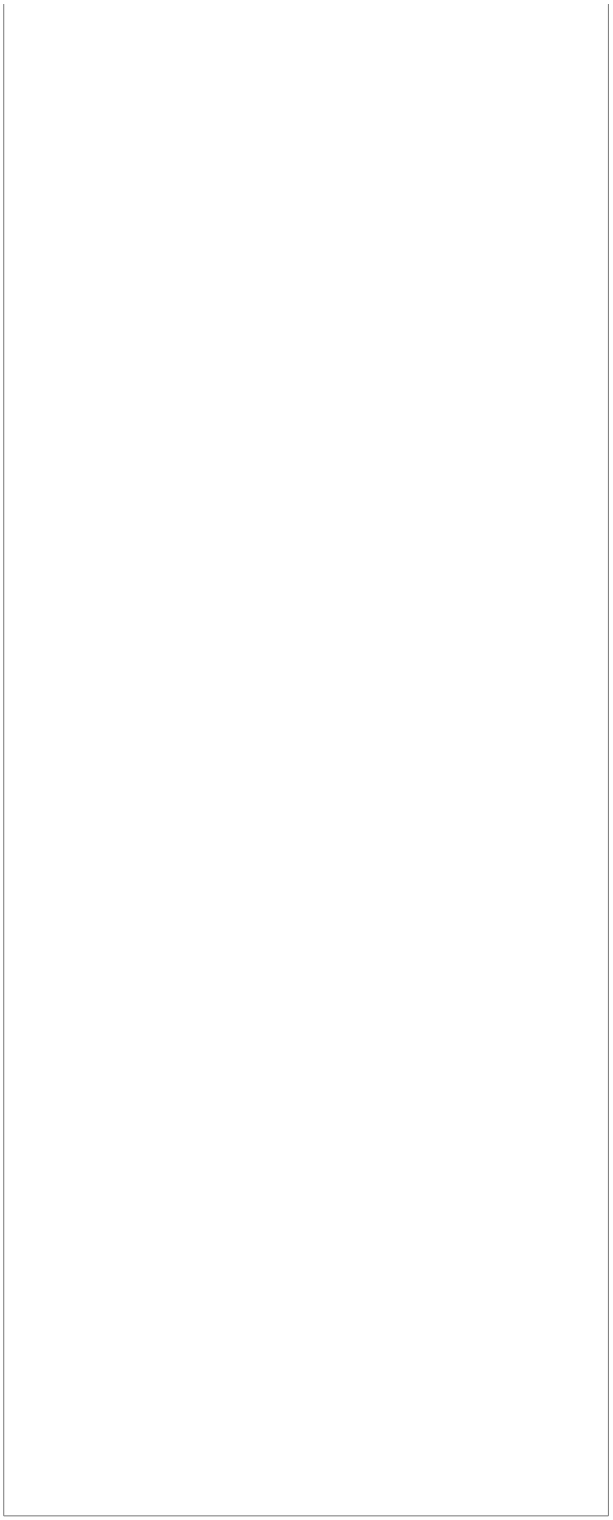
```
#include <iostream>
#include <cstdlib>
using namespace std;

int main()
{
  int a[5];

  for (int i=0; i<5; ++i) a[i] = rand();

  for (_____________________________________;

       _____________________________________;

       _____________________________________)
  {

    ___________________________________________

    ___________________________________________

    ___________________________________________
  }

  return 0;
}
```

Question 8

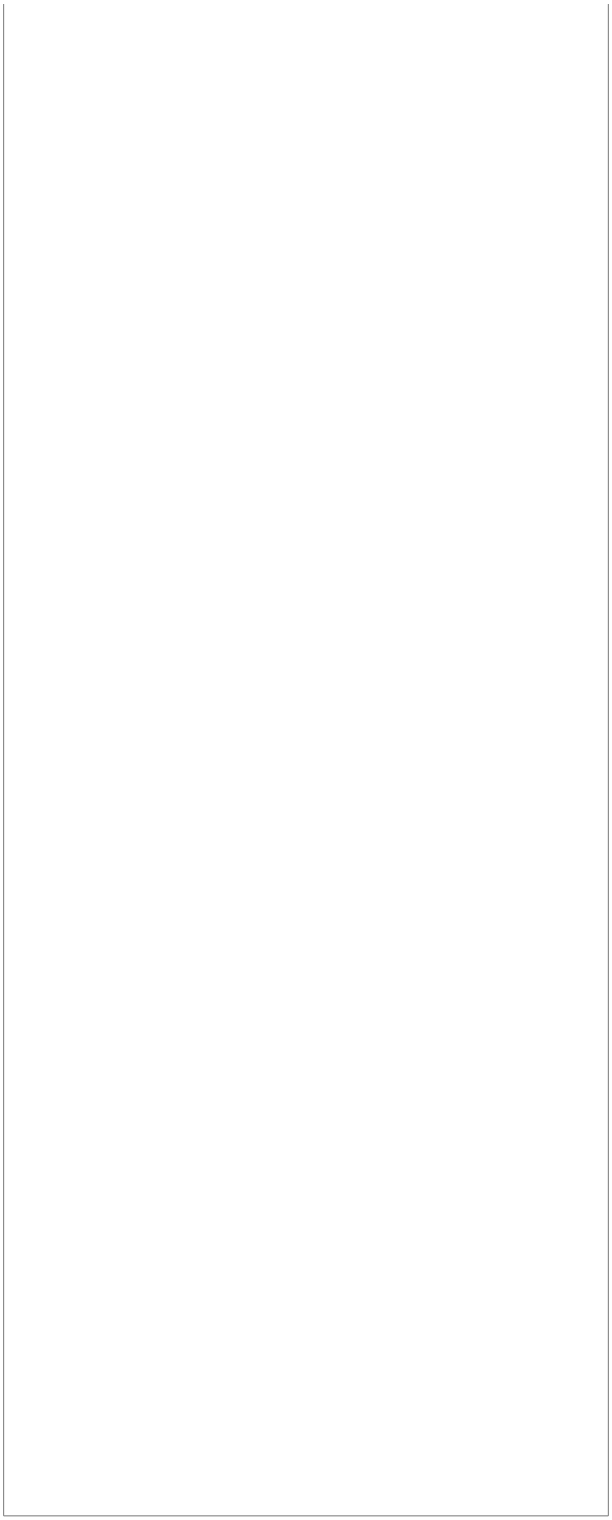
Illustrate the content of stack and heap memories at line 20 of the code shown below.

```
1  #include <iostream>
2  #include <cstdlib>
3  using namespace std;
4
5  int main()
6  {
7    int a = (rand() / rand());
8
9    int *b = new int;
10   *b = 2;
11
12   for (int i=0; i<3; ++i) {
13     int c = 2 * i;
14     int *d = new int;
15     *d = 2*c;
16     cout << "c=" << c << " d=" << *d << endl;
17   }
18
19   int* c = b;
20
21   delete b;
```

```
22    return 0;
23  };
```



Stack



Heap