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	_____ /8
3	_____ /2
4	_____ /4
5	_____ /2
6	_____ /2
7	_____ /4
Total	_____ /26

Instructions

- Please write in pen.
- Be tidy and neat.
- This exam sheet contains a total of 8 pages.

Written Part

Question 1

What is the output of the following piece of code.

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

int main()
{
    int i = 22;
    int j = i++;

    cout << "i=" << i << " j=" << j << endl;
    return 0;
}
```

Output

Question 2

The following function copies an array of character `s` to an array of character `d`. It assumes that `d` is the same size is `s`.

```
void strcopy(char* s, char* d)
{
  char* p = s;
  char* q = d;

  while (*p)
  {
    *(q++) = *(p++);
  }
  q = 0;
}
```

For example

```
char s[] = "Hello world";
char d[12];
strcpy(s, d);
// Now d is also "Hello world"
```

You are asked to write a function that reverse copies array `s` into `d`. We again assume that `d` is the same length as `s`, but we don't know the length of `s` or `d`. The reverse copy function will be used as follows

```
char s[] = "Hello world";
char d[12];
revstrcpy(s, d);
// Now d is also "dlrow olleH"
```

Provide `void revstrcopy(char* s, char* d)` body below

Question 3

Provide an assignment operator for the following class.

```
class Person
{
protected:
    int age;
    string name;

public:
    Person(int age_, string name_)
        : age(age_), name(name_) {}

    //TO DO

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

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

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

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

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

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

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

Question 4

Circle the bug(s) in the following code. The following code may contain both syntax and logic errors.

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

class vec {
protected:
    int sz;
    double* data;

public:
    vec() : sz(0), data(0) {}
    vec(int sz_) : sz(_sz)
    {
        data = new double[sz];
    }
    ~vec() { delete [] data; }

    // The following function copies the other
    // vector to this vector
    void copyvec(vec* o) {
        data = new double[o.sz];
        for (int i=0; i<sz; ++i) data[i] = o.data[i];
```

```
    }
};
```

In a bullet form, briefly explain the errors that you have found in the program above. Suggest any remedies as well.

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;
}
```

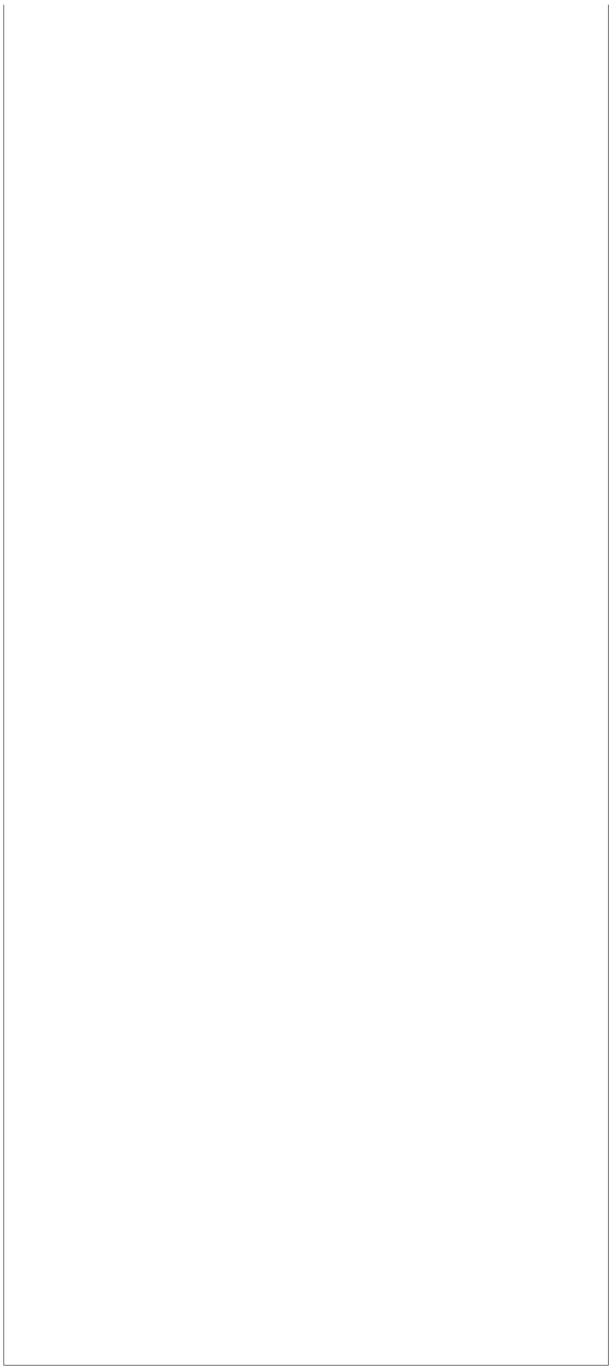
Output

Question 6

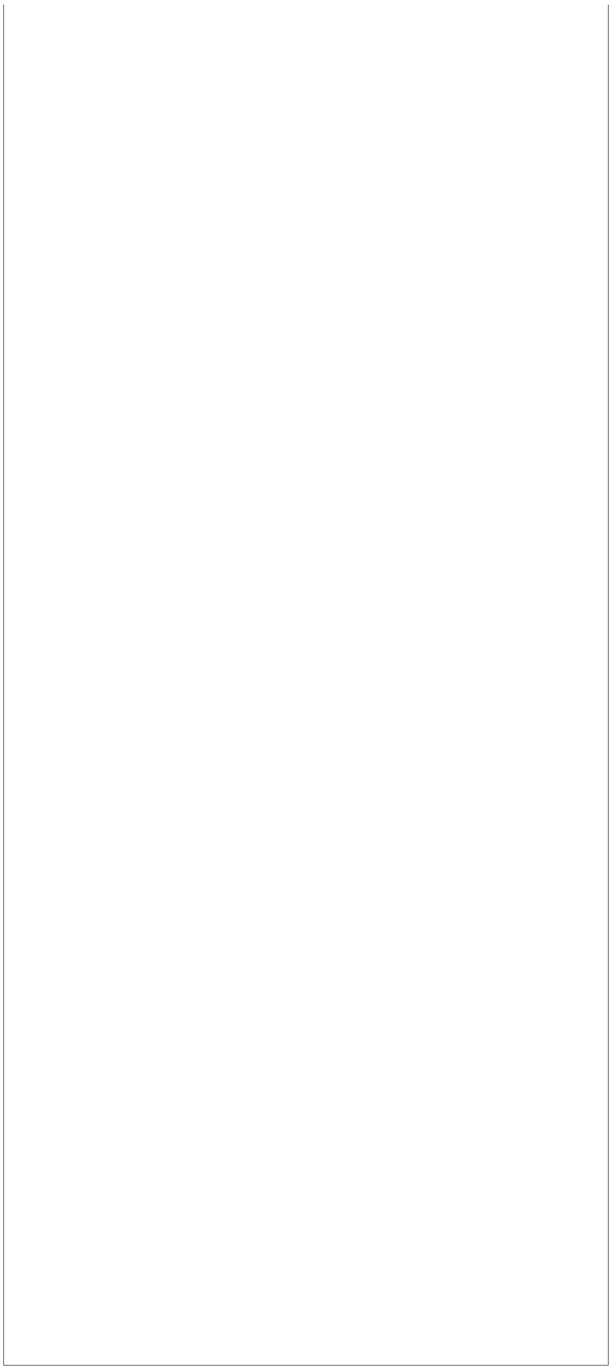
Illustrate the content of stack and heap memories at line 22 of the code shown below. Use `?` to indicate an unknown value.

```
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    delete b;
21    int d = *c;
22
23    return 0;
24  };
```



Stack



Heap

Question 7

Consider the code given below:

```
int x = 5
int* y = new int(3);
int** z = &y;
int A[5] = {1,2,3,4,5}
```

What is the output of the following statements:

Statement 1

```
cout << *&x << endl;
```

Output

Statement 2

```
cout << *(A+*y) << endl;
```

Output

Statement 3

```
cout << A[**z] << endl;
```

Output

Statement 4

```
cout << *(A+2) << endl;
```

Output