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: 

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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.

```cpp
#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.

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

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

For example

```cpp
char s[] = "Hello world";
char d[12];
strncpy(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

```cpp
char s[] = "Hello world";
char d[12];
revstrncpy(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) {} // The following function copies the other vector to this vector
    vec(int sz_) : sz(sz_) {
        data = new double[sz];
    }
    ~vec() { delete [] data; }

    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.

```cpp
#include <iostream>
#include <cstdlib>
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

```
8
```

Question 6

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

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

int main()
{
    int a = (rand() / rand());
    int *b = new int;
    *b = 2;
    for (int i=0; i<3; ++i) {
        int c = 2 * i;
        int *d = new int;
        *d = 2*c;
        cout << "c=" << c << " d=" << *d << endl;
    }
    int* c = b;
```
```c
    delete b;
    int d = *c;
    return 0;
};
```
Question 7

Consider the code given below:

```c
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 << *z << endl;
```

Output
```
```

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

Output
```
```

Statement 3
```
cout << A[*z] << endl;
```

Output
```
```

Statement 4
```
cout << *(A+2) << endl;
```

Output
```
```