

Quiz 3 CMPSC 16, PROBLEM SOLVING WITH COMPUTERS, SUMMER 2016

NAME:

DATE:

Problem 1.(10 points.) What does the `fstream` library (i.e., `#include <fstream>`) include?

Input and output streams for reading and writing files on the disk.

Problem 2.(10 points.) Why do the indices for arrays start at 0 instead of 1 (e.g., `array[0]`)?

Because they are offsets that are added to the memory address where the array is stored. (e.g., `array[0]` points to `address+0`, `array[1]` points to `address+1` element, etc.)

Problem 3.(10 points.) What happens if `in_stream.open("infile.dat")` fails?

Nothing, the program continues to execute. The programmer must call `in_stream.fail()` to check the status.

Problem 4.(10 points.) What is special about the `'\n'` character?

It is interpreted as a line-break (i.e., it will start a new line in a file or on the terminal)

Problem 5.(10 points.) What will this program output?

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

void do_something(int a[], int len) {
    for (int i = 0; i < len; i++) {
        a[i] = a[ (i+1)%len ];
    }
}

int main() {
    int array [] = {0,1,2,3,4,5};
    do_something(array, 6);
    for (int ele: array) {
        cout << ele << " ";
    }
    return 0;
}
```

1 2 3 4 5 1

Problem 6.(10 points.) What will this program output?

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

int main() {
    int array [] = {5,4,3,2,1,0};
    for (int i: array) {
        cout << array[i] << " ";
    }
    return 0;
}
```

0 1 2 3 4 5

Problem 7 [File Open].(10 points.) What should this program do? Where is the bug, and what effect will it have? Fix it.

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

int main() {
    // Declare variables
    string filename;
    ofstream out;
    ifstream in;
    int num = 0, sum = 0;

    // Get the filename
    cout << "Enter filename:" << endl;
    cin >> filename;

    // Open the file
    out.open(filename);
    in.open(filename);

    // Read input
    if (!in.fail()) {
        while (in >> num) {
            sum += num;
        }
        in.close();
    }

    // Store output
    if (!out.fail()) {
        out << sum << endl;
        out.close();
    }
}
```

This should take a list of numbers in a file and sum them, storing the result in the same file. The bug is that when you open a file as an output stream it will erase the contents, thus this will always be 0.

Problem 8 [User Input & Arrays].(10 points.) What should this program do? Where is the bug, and what effect will it have? Fix it.

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

int main() {
    // Declare variables
    int array[10];
    int index = 0;
    int input = 0;

    // Get input
    while (true) {
        cout << "Give me a number:" << endl;
        cin >> input;
        if (input == 0) {
            break;
        }
        array[index++] = input;
    }

    // Print output
    for (int i = index - 1; i >= 0; i--) {
        cout << array[i] << " ";
    }
    cout << endl;
}
```

The program should take in a list of numbers and then output them in reverse order. However, the program will allow the user to input numbers forever, overwriting other memory on the system.

Problem 9.(10 points.) What will this program do (brief description)?

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

int main() {
    // Declare variables
    string filename;
    ifstream in;

    // Get the filename
    cout << "Enter filename:" << endl;
    cin >> filename;

    // Open the file
    in.open(filename);

    // Read input
    if (!in.fail()) {
        char c;
        char prev_c = '\0';
        while (in.get(c)) {
            if (c == '_' && prev_c == '_') {
                continue;
            }
            cout << c;

            prev_c = c;
        }
        in.close();
    }
}
```

It will read a file and output the contents of the file ensuring that no more than one space appears in succession.

Problem 10.(10 points.) What will this program do (brief description)?

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

// swap the values in a and b
void swap(int& a, int&b) {
    int tmp = b;
    b = a;
    a = tmp;
}

void do_something(int array[], int len) {

    // Compare every element to every other element
    for (int i = 0; i < len; i++) {
        for (int j = i+1; j < len; j++) {

            if (array[i] == 1 && array[j] == 0) {
                swap(array[i], array[j]);
                break;
            }
        }
    }
}

int main() {
    // Declare variables
    int array[] = {1,0,0,1,1,0,1,0};

    do_something(array, 8);

    // Output our results
    for (int x: array) {
        cout << x << " ";
    }
    cout << endl;
}
```

It will divide the array such that all zeros are on the left and all ones are on the right (e.g., 0 0 0 0 1 1 1 1)