

Review Problems for Final Exam

1. What is the output of the following program?

```
#include <iostream>
#include <string>

using namespace std;

int draw(int n);

int main(void)
{
    int n = 4;
    while (n>0)
        n = draw(n);

    return 0;
}

int draw(int n)
{
    for(int i = 0; i < n; i++)
        cout << "*" ;
    cout << endl;
    return n-1;
}
```

```
/*
Solution:
```

```
*/
```

2. What is the output of the following program?

```
#include <iostream>
#include <string>

using namespace std;

int x = 1000;

void compute1(int& x);
void compute2(int y);

int main(void)
{
    int x = 200;

    cout << "1: " << x << endl;
    compute1(x);
    cout << "2: " << x << endl;
    compute2(x);
    cout << "3: " << x << endl;

    return 0;
}

void compute1(int& x)
{
    x /= 2;
}

void compute2(int y)
{
    y *= 2;
    cout << "?: " << x << endl;
}

/*
Solution:

*/
```

3. What is the output of the following program?

```
#include <iostream>
#include <string>

using namespace std;

string guess (string x);

int main(void)
{
    string friends[] = {"John", "Lucy", "Juan", "Peter", "Rita"};
    friends[3] = "Juan";
    int i = 0;
    while (friends[i] != "Rita")
    {
        guess(friends[i]);
        i++;
    }
    return 0;
}

string guess (string x)
{
    static string name = "Tony";

    if (name == x) cout << "I guessed!" << endl;
    else cout << ":-)" << endl;

    name = x;
    return "Bye";
}
```

```
/*
Solution:
```

```
*/
```

4. What is the output of the following program?

```
#include <iostream>
#include <string>

using namespace std;

string compute (string x);

int main(void)
{
    string friends[] = {"John", "Lucy", "Juan", "Rita"};

    for(int i = 0; i < 4; i++)
        cout << friends[i] << " " << compute(friends[i]) << endl;

    return 0;
}

string compute (string x)
{
    char y = x[0]; x[0] = x[3]; x[3] = y;
    char z = x[1]; x[1] = x[2]; x[2] = z;
    return x;
}
```

```
/*
Solution:
```

```
*/
```

5. What is the output of the following program?

```
include <iostream>
#include <string>

using namespace std;

struct Car
{
    string brand;
    int mileage;
    int year;
};

int compute (int x);

int main(void)
{
    string brands[] = {"Ford", "Honda", "BMW", "Volvo"};
    int mileages[] = {0, 12345, 450, 8642};
    int years[] = {2011, 2008, 2009, 2010};
    Car cars[4];

    for(int i = 0; i < 4; i++)
    {
        cars[i].brand = brands[i];
        cars[i].mileage = mileages[compute(i+1)];
        cars[i].year = years[compute(i+2)];
    }

    for(int i = 0; i < 4; i++)
        cout<< cars[i].brand << ", " << cars[i].mileage << ", " <<
cars[i].year << endl;

    return 0;
}

int compute (int x)
{
    if (x > 3) return x - 4;
    return x;
}

/*
Solution:

*/
```

6. Assume the following structure declaration is given

```
struct Rectangle
{
    int length;
    int width;
};
```

Write a function that stores the user's input in the members of the structure and returns the structure.

7. A weather analysis program uses the following array to store the temperature for each hour of the day on each day of a week:

```
int temp[7][24];
```

Each row represents a day (0 = Sunday, 1 = Monday, 2 = Tuesday, etc.) and each column represents a time (0 = midnight, 1 = 1 a.m., ..., 12 = noon, 13 = 1 p.m., etc.).

Write a program to find Tuesday's average temperature.

8. Assume studentNames and studentIDs are two parallel arrays of size N that hold student data. Write a function that returns the ID of a student with a given name.

9. Write a function that copies elements of one integer array to another integer array. You can assume that both arrays are of the same size.

10. Write a function that takes two two-dimensional arrays "int a[5][5]" and "int b[5][5]", and swaps them. After the function call, a must store all elements of b and vice versa.

11. Indicate whether the following statements are valid or not.

```
int cat[10];           //Correct?   Incorrect?
double rat[5.5];      //Correct?   Incorrect?
int n = 5;
string dog[n];        //Correct?   Incorrect?
const long m = 100;
char frog[m];         //Correct?   Incorrect?
```

12. Indicate whether each of the following array definitions is valid or invalid.

```
int cat[5] = {2, 34, 45, 78, 10, 200}; //Correct?   Incorrect?
double dog[6] = {23.22, 44.55}; //Correct?   Incorrect?
int rat[10] = {2, 3, , 4, 5, , 6}; //Correct?   Incorrect?
char bat[4] = {"A", "B", "1", "2"}; //Correct?   Incorrect?
```

13. Is there a logical or syntactic problem with the following program that allows a user to compute the sum of two integers? If so, correct the problem.

```
#include <iostream>
#include <string>

using namespace std;

int main(void)
{
    string answer = "y";
    int count = 0;

    while(answer == "y")
    {
        int x, y;
        cout << "Enter two integers: ";
        cin >> x >> y;
        cout << x << " + " << y << " = " << x + y << endl;
        cout << "Continue? (y/n) ";
        cin >> answer;
        if (answer != "n" && answer != "y")
            answer = "n";
        count++;
    }

    cout << "The loop had " << count << " iterations" << endl;

    return 0;
}
```

14. Is there a logical or syntactic problem with the following program that computes an average of all positive integers in an array? If so, correct the problem.

```
#include <iostream>

using namespace std;

double average(int a[], int n);

int main(void)
{
    int a[5] = {2, 0, -4, -5, 20};

    double r = average(a, 5);

    if (r == -1) cout << "The array has no positive integers" <<
endl;
    else cout << "The average of positive integers in the array is "
<< r << endl;

    return 0;
}

double average(int a[], int n)
{
    int sum = 0;
    int count = 0;
    for(int i=0; i <=n; i++)
        if (a[i] > 0) {
            sum += a[i];
            count++;
        }

    if (count > 0) return sum/count;
    return -1;
}
```


15. Is there a logical or syntactic problem with the following program that computes an average of all positive integers in an array? If so, correct the problem.

```
#include <iostream>

using namespace std;

double average(int a[], int n);

int main(void)
{
    int a[5] = {2, 0, -4, -5, 20};

    double r = average(a, 5);

    if (r == -1) cout << "The array has no positive integers" <<
endl;
    else cout << "The average of positive integers in the array is "
<< r << endl;

    return 0;
}

double average(int a[], int n)
{
    int sum = 0;
    int i = 0;
    int count = 0;
    while(true) {
        if (a[i] > 0) {
            sum += a[i];
            count++;
        }
        else continue;

        i++;
        if (i == n) break;
    }

    if (count > 0) return sum/count;
    return -1;
}
```