

Arrays Worksheet

1. What would be a valid range for the index of an array of size 64?

0 to 63

2. What is the output of the following program segment?

```
double temp[5];
for (int i = 0; i < 5; i++)
    temp[i] = pow(i, 2.0) + 2;
for (int i = 0; i < 5; i++)
    cout << temp[i] << " ";
cout << endl;
temp[0] = pow(temp[1], 3);
temp[1] = temp[4] - temp[2];
temp[2] = temp[0] - 5;
for (int i = 0; i < 5; i++)
    cout << temp[i] << " ";
cout << endl;
```

2 3 6 11 18

27 12 22 11 18

3. What is stored in list after the following C++ code executes?

```
int list[10];
for (int i = 0; i < 5; i++)
{
    list[i] = i * i - 5;
    if (i % 3 == 0)
        list[i] = list[i] + i;
    else
        list[i] = list[i] - i;
}
```

[-5, -5, -3, 7, 7, 5 uninitialized ints]

4. What is stored in list after the following C++ code executes?

```
int list[10];
list[0] = 2;
list[1] = 3;
for (int i = 2; i < 10; i++)
{
    list[i] = list[i - 1] + list[i - 2];
}
```

```

        if (i > 7)
            list[i] = 2 * list[i] - list[i - 2];
    }

```

[2, 3, 5, 8, 13, 21, 34, 55, 144, 343]

5. What is stored in myList after the following C++ code executes?

```

double myList[5];
myList[0] = 3.0;
myList[1] = 4.0;
for (int i = 2; i < 5; i++)
{
    myList[i] = myList[i - 1] * myList[i - 2];
    if (i > 3)
        myList[i] = myList[i] / 4;
}

```

[3, 4, 12, 48, 144]

6. Correct the following code so that it correctly sets the value of each element of myList to the index of the element.

```

int myList[10];
for (int i = 1; i <= 10; i--)
    myList[i] = [i];

```

```

int myList[10];
for (int i = 0; i < 10; ++i)
    myList[i] = i;

```

7. Write C++ statements to define and initialize the following arrays.

- a. Array heights of 10 components of type double. Initialize this array to the following values: 5.2, 6.3, 5.8, 4.9, 5.2, 5.7, 6.7, 7.1, 5.10, 6.0.

```

double heights[] = {5.2, 6.3, 5.8, 4.9, 5.2, 5.7, 6.7, 7.1, 5.1,
6.0};

```

- b. Array weights of 7 components of type int. Initialize this array to the following values: 120, 125, 137, 140, 150, 180, 210.

```

int weights[] = {120, 125, 137, 140, 150, 180, 210};

```

- c. Array specialSymbols of type char. Initialize this array to the following values: '\$', '#', '%', '@', '&', '!', '^'.

```
char specialSymbols[] = {'$', '#', '%', '@', '&', '!', '^'};
```

- d. Array seasons of 4 components of type string. Initialize this array to the following values: "fall", "winter", "spring", "summer".

```
string seasons[] = {"fall", "winter", "spring", "summer"};
```

8. Determine whether the following array declarations are valid. If a declaration is valid, determine the size of the array.

- a. `int list[] = {18, 13, 14, 16};`

valid, size = 4

- b. `int x[10] = {1, 7, 5, 3, 2, 8};`

valid, size = 10

- c. `double y[4] = {2.0, 5.0, 8.0, 11.0, 14.0};`

invalid

- d. `double lengths[] = {8.2, 3.9, 6.4, 5.7, 7.3};`

valid, size = 5

- e. `int list[7] = {12, 13, , 14, 16, , 8};`

invalid

- f. `string names[8] = {"John", "Lisa", "Chris", "Katie"};`

valid, size = 8

9. Suppose that you have the following declaration:

```
int list[7] = {6, 10, 14, 18, 22};
```

If this declaration is valid, what is stored in each components of list.

```
list = [6, 10, 14, 18, 22, 0, 0]
```

10. Consider the following declaration:

```
int list[] = {3, 8, 10, 13, 6, 11};
```

- a. Write a C++ code that will output the value stored in each component of list.

```
for (int i = 0; i < 6; ++i)
    cout << list[i] << " ";
```

- b. Write a C++ code that will set the values of the first five components of list as follows:
The value of the i th component is the value of the i th component minus three times the value of the $(i+1)$ th component.

```
for (int i = 0; i < 5; ++i)
{
    list[i] = list[i] - 3 * list[i+1];
}
```

11. Write a C++ program that declares an array alpha of 50 components of type `double`. Initialize the array so that the first 25 components are equal to the square of the index variable, and the last 25 components are equal to three times the index variable. Output the array so that 10 elements per line are printed.

```
#include <iostream>
```

```
using namespace std;
```

```
int main()
{
    double alpha[50];

    for (int i = 0; i < 25; ++i) {
        alpha[i] = i * i;
    }

    for (int i = 25; i < 50; ++i) {
        alpha[i] = 3 * i;
    }

    for (int i = 0; i < 5; ++i) {
        for (int j = 0; j < 10; ++j) {
            cout << alpha[10 * i + j] << "\t";
        }
        cout << "\n";
    }
}
```

12. Write a program that lets the user enter the total rainfall for each of 12 months into an array of doubles. The program should calculate and display the total rainfall for the year, the average monthly rainfall, and the months with the highest and lowest amounts.

Input Validation: Do not accept negative numbers for monthly rainfall figures.

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

int main()
{
    double rainfall[12] = {};
    string months[12] = {"Jan", "Feb", "Mar", "Apr", "May", "Jun",
                        "Jul", "Aug", "Sep", "Oct", "Nov", "Dec"};

    double average = 0;
    int max = 0;
    int min = 0;

    cout << "Please enter in the monthly rainfall data:\n";

    for (int i = 0; i < 12; ++i) {
        cout << months[i] << ": ";
        while ((cin >> rainfall[i]) && rainfall[i] < 0) {
            cout << "[ERROR] No negative values allowed. Try again\n";
            cout << months[i] << ": ";
        }

        if (rainfall[i] > rainfall[max]) {
            max = i;
        } else if (rainfall[i] < rainfall[min]) {
            min = i;
        }

        average += rainfall[i] / 12.0;
    }

    cout << "\n";

    cout << "Mean Rainfall: " << average << "\n";

    cout << "Max Rainfall was in " << months[max] << " with "
        << rainfall[max] << "\n";

    cout << "Min Rainfall was in " << months[min] << " with "
        << rainfall[min] << "\n";
}
```