CSCI 140 PA 1 Submission

Due Date: 08/26/2021 Late (date and time):_____

Name(s): Nero Li

Exercise 1 -- need to submit source code and I/O

-- check if completely done ✔ ; otherwise, discuss issues below

Source code below:

```
/*  Program: PA_1_exercise_1
    Author: Nero Li
    Class: CSCI 220
    Date: 08/24/2021
    Description:
        Write a C++ function or a Java method that
        takes an array of int values and determines
        if all the numbers are different from each
        other (that is they are distinct).Include
        a driver to test your function/methodwith
        at least twotest cases:  all values are
        distinct(5, 7, 2, 6, 4) and two or more
        values are the same(5, 7, 2, 6, 4, 2).

    I certify that the code below is my own work.

    Exception(s): N/A

*/

#include <iostream>

using namespace std;
```

```
const int SIZE{10000};

bool func(int testArray[SIZE], int amount)
{
    for (int i = 0; i < amount; i++)
    {
        for (int j = i + 1; j < amount; j++)
        {
            if (testArray[i] == testArray[j])
            {
                return false;
            }
        }
    }

    return true;
}

int main()
{
    int testArray[SIZE];
    int amount, i{3};

    while (--i)
    {
        cout << "Input the amount for array: ";
        cin >> amount;
        cout << "Input the integer for array: \n";
        for (int i = 0; i < amount; i++)
        {
            cin >> testArray[i];
        }

        if (func(testArray, amount))
        {
```

```
            cout << "All values are distinct (" << testArray[0];
        }
        else
        {
            cout << "Two or more values are the same (" << testArray[0];
        }

        for (size_t i = 1; i < amount; i++)
        {
            cout << ", " << testArray[i];
        }
        cout << ")." << endl;
    }

    cout << "Author: Nero Li\n";

    return 0;
}
```

Input/output below:

```
Input the amount for array: 6
Input the integer for array:
5 7 2 6 4 0
All values are distinct (5, 7, 2, 6, 4, 0).
Input the amount for array: 6
Input the integer for array:
5 7 2 6 4 5
Two or more values are the same (5, 7, 2, 6, 4, 5).
Author: Nero Li
```

Exercise 2 -- need to submit source code and I/O

-- check if completely done ✔; otherwise, discuss issues below

Source code below:

```
/*  Program: PA_1_exercise_2
    Author: Nero Li
    Class: CSCI 220
    Date: 08/24/2021
    Description:
        The birthday paradox says that the probability
        that two people in a room will have the same
        birthday is more than half as long as the number
        of people in the room (n), is more than 23. This
        property is not really a paradox, but many people
        find it surprising. Design a C++ program that can
        test this paradox by a series of experiments on
        randomly generated birthdays, which test this
        paradox for n = 5,10,15,20,...,100. You should run
        at least 10 experiments for each value of n and it
        should output, for each n, the number of experiments
        for that n, such that two people in that test have
        the same birthday.

    I certify that the code below is my own work.

      Exception(s): N/A

*/

#include <iostream>
#include <iomanip>
#include <ctime>

using namespace std;
```

```
bool checkDuplicate(int day[], int n)
{
    for (int i = 0; i < n; i++)
    {
        for (int j = i + 1; j < n; j++)
        {
            if (day[i] == day[j])
            {
                return true;
            }
        }
    }

    return false;
}

void func()
{
    int day[100];

    cout << "N" << setw(20) << "Count out of 10" << endl;
    srand(time(NULL));
    for (int n = 5; n <= 100; n += 5)
    {
        int count{0};
        cout << left << setw(3) << n;
        for (int i = 0; i < 10; ++i)
        {
            for (int p = 0; p < n; ++p)
            {
                day[p] = rand() % 365;
            }

            if (checkDuplicate(day, n))
```

```
            {
                count++;
            }
        }

        cout << setw(9) << " ";
        cout << count << endl;
    }
}

int main()
{
    func();

    cout << "Author: Nero Li\n";

      return 0;
}
```

Input/output below:

```
N     Count out of 10
5           0
10          1
15          1
20          4
25          6
30          8
35          10
40          9
45          10
50          9
55          10
60          10
65          10
```

```
70          10
75          10
80          10
85          10
90          10
95          10
100         10
Author: Nero Li
```

Answer for Question 1:

The purposes of parameters is to help us give data outside the function and make it run with these passed data.

Answer for Question 2:

Component	Function
Data member	The variables or constants inside the class.
Member function	The functions inside the class.
Access control	Separate into two sections called private and public. Only the functions inside the class have access to the private data members. All the other functions outside the class have access to use members in public section.
Constructor	A special member function for a class to do initialization. Class T has a constructor denoted as T().
Destructor	A special member function for a class to clean or delete itself after using it. Class T has a destructor denoted as ~T().

Extra Credit

Source code below:

```
/*  Program: PA_1_extra_credit
    Author: Nero Li
    Class: CSCI 220
    Date: 08/24/2021
    Description:
        Write an efficient C++ function that takes
        any integer value i and returns 2^i, as a
        long value. Your function should not multiply
        2 by itself i times; there are much faster ways
        of computing 2^i.

    I certify that the code below is my own work.

      Exception(s): N/A

*/

#include <iostream>

using namespace std;

long func(long i)
{
    return 1 << i;
}

int main()
{
    cout << "Final answer for 2^3 is " << func(3) << endl;
    cout << "Final answer for 2^20 is " << func(20) << endl;
    cout << "Author: Nero Li\n";
```

```
	return 0;
}
```

Input/output below:

```
Final answer for 2^3 is 8
Final answer for 2^20 is 1048576
Author: Nero Li
```