## 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