Name: Md Jubair Pantho

UTC ID : WZS444

Course : CPSC 5010

Homework: 3

Problem 3.1:
Source code and Results:

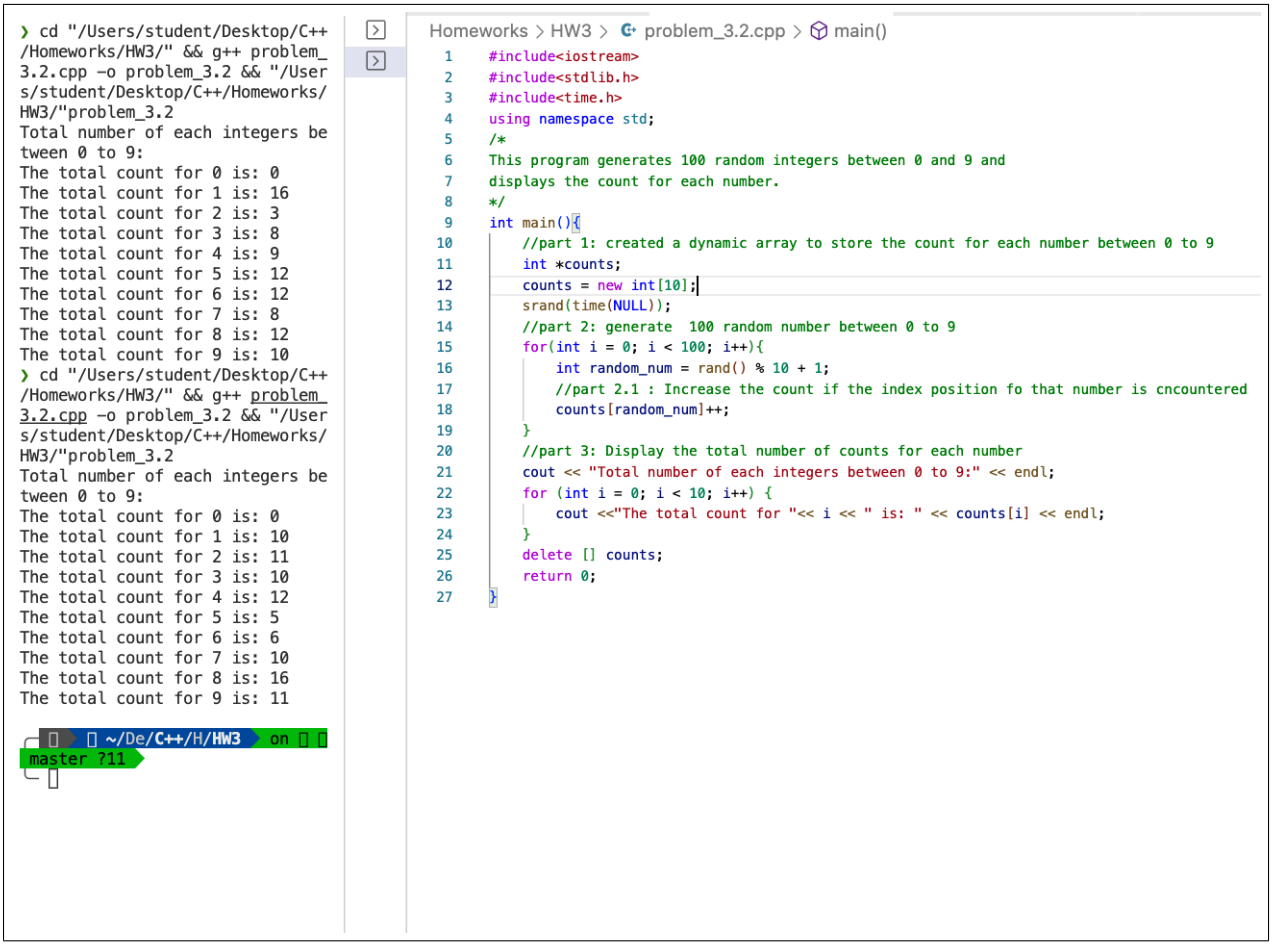
```
❯ cd "/Users/student/Desktop/C++/Homeworks/HW3/" && g++ problem_3.1.cpp -o problem_3.1 && "/Users/student/Desktop/C++/Homeworks/HW3/"problem_3.1
Enter the 1 th number: 4
Enter the 2 th number: 3
Enter the 3 th number: 5
Enter the 4 th number: 6
Enter the 5 th number: 5
Enter the 6 th number: 4
Enter the 7 th number: 4
Enter the 8 th number: 3
Enter the 9 th number: 5
Enter the 10 th number: 4
The total number of distinct numbers are: 4
The distinct numbers are: 4 3 5 6

 ~/De/C++/H/HW3 on  master ?11
```

Homeworks > HW3 > problem_3.1.cpp > returnDistinctNumber(int *, int, int)

```cpp
#include<iostream>
using namespace std;
/*
This program prompt the users to enter ten numbers and return only the distinct numbers
*/
//part 1: function to return distinct numbers from an array
bool returnDistinctNumber(int *array, int size, int num){
    //part 1.1 : Iterating through all the elements in the array to check if the user input is in the arrary or not
    for(int i = 0; i < size; i++){
        if(num == array[i])
            return false;
    }
    return true;
}
int main(){
    //part 2: Declaring a dynamic array to hold the distinct number
    int *numbers;
    numbers = new int[10];
    int num;
    int count = 0;

    //part 3: Prompt the user to enter ten distinct numbers
    for(int i = 1; i <= 10; i++){
        cout << "Enter the " << i << " th number: ";
        cin >> num;

        //part 3.1: if the number is distinct the it's stored in the array
        if(returnDistinctNumber(numbers, count, num)){
            numbers[count] = num;
            count++;
        }
    }
    //part 4: print the total distinct number and the distinct numbers
    cout << "The total number of distinct numbers are: " << count << endl;
    cout << "The distinct numbers are: ";
    for(int i = 0; i < count; i++){
        cout << numbers[i] << " ";
    }
    cout << endl;
    delete [] numbers;
    return 0;
}

```

Please click on the highlighted coding video link : Problem 3.1

Problem 3.2:
Source code and Results:



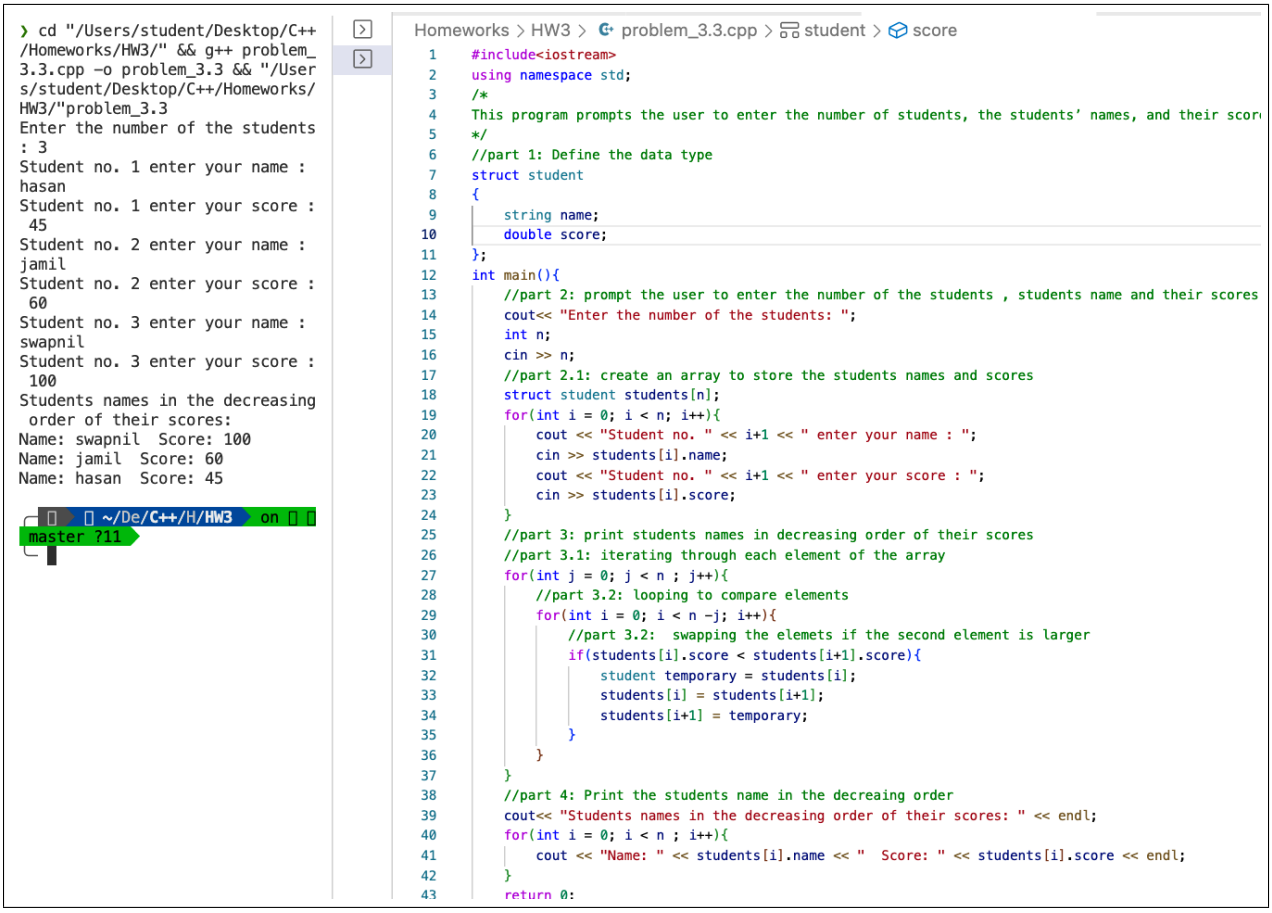
```
❯ cd "/Users/student/Desktop/C++/Homeworks/HW3/" && g++ problem_3.2.cpp -o problem_3.2 && "/Users/student/Desktop/C++/Homeworks/HW3/"problem_3.2
Total number of each integers between 0 to 9:
The total count for 0 is: 0
The total count for 1 is: 16
The total count for 2 is: 3
The total count for 3 is: 8
The total count for 4 is: 9
The total count for 5 is: 12
The total count for 6 is: 12
The total count for 7 is: 8
The total count for 8 is: 12
The total count for 9 is: 10
❯ cd "/Users/student/Desktop/C++/Homeworks/HW3/" && g++ problem_3.2.cpp -o problem_3.2 && "/Users/student/Desktop/C++/Homeworks/HW3/"problem_3.2
Total number of each integers between 0 to 9:
The total count for 0 is: 0
The total count for 1 is: 10
The total count for 2 is: 11
The total count for 3 is: 10
The total count for 4 is: 12
The total count for 5 is: 5
The total count for 6 is: 6
The total count for 7 is: 10
The total count for 8 is: 16
The total count for 9 is: 11

 ~/De/C++/H/HW3 on  master ?11
```

Homeworks > HW3 > problem_3.2.cpp > main()

```cpp
#include<iostream>
#include<stdlib.h>
#include<time.h>
using namespace std;
/*
This program generates 100 random integers between 0 and 9 and
displays the count for each number.
*/
int main(){
    //part 1: created a dynamic array to store the count for each number between 0 to 9
    int *counts;
    counts = new int[10];
    srand(time(NULL));
    //part 2: generate  100 random number between 0 to 9
    for(int i = 0; i < 100; i++){
        int random_num = rand() % 10 + 1;
        //part 2.1 : Increase the count if the index position fo that number is cncountered
        counts[random_num]++;
    }
    //part 3: Display the total number of counts for each number
    cout << "Total number of each integers between 0 to 9:" << endl;
    for (int i = 0; i < 10; i++) {
        cout <<"The total count for "<< i << " is: " << counts[i] << endl;
    }
    delete [] counts;
    return 0;
}
```

Please click on the highlighted coding video link : Problem 3.2

Problem 3.3:
Source code and Results:



```
❯ cd "/Users/student/Desktop/C++/Homeworks/HW3/" && g++ problem_3.3.cpp -o problem_3.3 && "/Users/student/Desktop/C++/Homeworks/HW3/"problem_3.3
Enter the number of the students: 3
Student no. 1 enter your name : hasan
Student no. 1 enter your score : 45
Student no. 2 enter your name : jamil
Student no. 2 enter your score : 60
Student no. 3 enter your name : swapnil
Student no. 3 enter your score : 100
Students names in the decreasing order of their scores:
Name: swapnil  Score: 100
Name: jamil  Score: 60
Name: hasan  Score: 45

 ~/De/C++/H/HW3  on  master ?11
```

Homeworks > HW3 > problem_3.3.cpp > student > score

```cpp
#include<iostream>
using namespace std;
/*
This program prompts the user to enter the number of students, the students' names, and their scor
*/
//part 1: Define the data type
struct student
{
    string name;
    double score;
};
int main(){
    //part 2: prompt the user to enter the number of the students , students name and their scores
    cout<< "Enter the number of the students: ";
    int n;
    cin >> n;
    //part 2.1: create an array to store the students names and scores
    struct student students[n];
    for(int i = 0; i < n; i++){
        cout << "Student no. " << i+1 << " enter your name : ";
        cin >> students[i].name;
        cout << "Student no. " << i+1 << " enter your score : ";
        cin >> students[i].score;
    }
    //part 3: print students names in decreasing order of their scores
    //part 3.1: iterating through each element of the array
    for(int j = 0; j < n ; j++){
        //part 3.2: looping to compare elements
        for(int i = 0; i < n -j; i++){
            //part 3.2:  swapping the elemets if the second element is larger
            if(students[i].score < students[i+1].score){
                student temporary = students[i];
                students[i] = students[i+1];
                students[i+1] = temporary;
            }
        }
    }
    //part 4: Print the students name in the decreaing order
    cout<< "Students names in the decreasing order of their scores: " << endl;
    for(int i = 0; i < n ; i++){
        cout << "Name: " << students[i].name << "  Score: " << students[i].score << endl;
    }
    return 0;
```

Please click on the highlighted coding video link : Problem 3.3

Problem 3.4 (a) :
Source code and Results:

```
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 16
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 95
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 30
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 2
 Too high
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 18
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 96
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 6
Too low
Enter your guess between 1 to 10
0: 5
Your guess : 5
Random number was : 5
Correct guess !
It took 88 guesses to guess the
correct number

 ~/De/C++/H/HW3  on
 master ?11
```

Homeworks > HW3 > problem_3.4_a.cpp > main()

```cpp
#include<iostream>
#include<stdlib.h>
#include<time.h>
using namespace std;
/*
A program is needed that generates a random number between 1 and 100, then prompts the user to make a guess.
If the user's guess is too high or too low, the program should display a message indicating that the guess was "too high" or "too low".
The user should be allowed to keep guessing until they successfully guess the correct number.
*/
int main(){
    //part 1: Initiate the variables to count and store the random and the guess number
    int count = 0;
    int guessNumber, randomNumber;
    //part 2: setting up the condition to prompt the user until the correct  guess is acheived
    while(guessNumber!=randomNumber){
    //part 3: Prompt the user to enter the guess number
    cout << "Enter your guess between 1 to 100: ";
    cin >> guessNumber;
    cout<< "Your guess : "<< guessNumber << endl;
    //part 4: Generate a random number between 1 to 100
    randomNumber = rand() % 100 +1 ;
    cout << "Random number was : " << randomNumber << endl;
        count++;
    //part 5: if the guess and the random number are correct then the program will show the total count to get the correct guess
    if (guessNumber == randomNumber){
        cout << "Correct guess !" << endl;
        cout << "It took " << count << " guesses to guess the correct number" << endl;
    }
    //part 5: The program will output too high or too low if the guess is above or below the correct guess
    else if(guessNumber > randomNumber){
        cout << " Too high" << endl;
    }
    else {
        cout << "Too low" << endl;
    }

    }
    return 0;
}
```

Please click on the highlighted coding video link : Problem 3.4 (a)

Problem 3.4 (b) :
Source code and Results:

```
Your guess : 9
Random number was : 62
 Too high
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 8
Too low
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 63
 Too high
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 83
 Too high
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 80
 Too high
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 63
 Too high
Enter the number you want the co
mputer to guess between 1 to 100
: 9
Your guess : 9
Random number was : 9
Correct guess !
It took 51 guesses for the compu
ter to guess the number you gues
sed

 ~/De/C++/H/HW3  on  
 master ?11
```

Homeworks > HW3 > problem_3.4_b.cpp > main()

```cpp
#include<iostream>
#include<stdlib.h>
#include<time.h>
using namespace std;
/*
Modified the program so that instead of the user guessing a number the computer came up with,
the computer guesses the number that the user has secretly decided.
The user must tell the computer whether it guesed too high or too low.
*/
int main(){
    srand(time(NULL));
    //part 1: Initiate the variables to count and store the random and the guess number
    int count = 0;
    int guessNumber, randomNumber;
    //part 2: setting up the condition to prompt the user until the correct  guess is acheived
    while(guessNumber!=randomNumber){
    //part 3: Prompt the user to enter the guess number
    cout << "Enter the number you want the computer to guess between 1 to 100: ";
    cin >> guessNumber;
    cout<< "Your guess : "<< guessNumber << endl;
    //part 4: Generate a random number between 1 to 100
    randomNumber = rand() % 100 +1 ;
    cout << "Random number was : " << randomNumber << endl;
        count++;
    //part 5: if the computer guess guess and the user guess are correct then the program will show the total count to get the correct g
    if (guessNumber == randomNumber){
        cout << "Correct guess !" << endl;
        cout << "It took " << count << " guesses for the computer to guess the number you guessed" << endl;
    }
    //part 5: The program will output too high or too low if the guess is above or below the correct guess
    else if(randomNumber > guessNumber){
        cout << " Too high"  << endl;
    }
    else {
        cout << "Too low" << endl;
    }

    }
    return 0;
}

```

Please click on the highlighted coding video link : Problem 3.4 (b)

Problem 3.4 (c) :
Source code and Results:

```
❯ cd "/Users/student/Desktop/C++/Homeworks/HW3/" && g++ problem_3.4_c.cpp -o problem_3.4_c && "/Users/student/Desktop/C++/Homeworks/HW3/"problem_3.4_c
Enter your guess between 1 to 100: 5
Your guess : 5
Computer guess number was : 34
Too high!
Computer guess number was : 7
Too high!
Computer guess number was : 4
Too Low!
Computer guess number was : 5
Hooray! You have found the number in 4 guess
It took 4 trials to guess the number

 ~/De/C++/H/HW3  on  master ?11
```

Homeworks > HW3 > problem_3.4_c.cpp > main()

```cpp
int main(){
    //part 1: Initiate the variables to count and store the random and the guess number
    int count = 0;
    int userGuess, randomNumber, low = 1, high = 100, newHigh = 0;
    //part 2: Prompt the user to enter the guess number
    cout << "Enter your guess between 1 to 100: ";
    cin >> userGuess;
    cout<< "Your guess : "<< userGuess << endl;
    //part 3: setting up the condition to prompt the user until the correct  guess is acheived
    srand(time(NULL));
    while(userGuess!=randomNumber){
        count++;
        //part 3.1: if the count exceeds 7 then the computer can't find the correct guess in 7 or below trials
        if(count>7){
            cout<< "Computer can't guess it in 7 or less guesses!"<< endl;
            break;
        }
        //part 3.2: fix the computer guess to take the midpoint
        randomNumber = rand() % high + low;
        cout << "Computer guess number was : " << randomNumber << endl;

        //part 3.3: depending on the user response it uopdates the two terminal values to shring the guessing region
    if(userGuess == randomNumber){
        cout << "Hooray! You have found the number in " << count << " guess" << endl;
        break;
    }
    else if(randomNumber < userGuess){
        cout << "Too Low!" << endl;
        newHigh = low + high;
        low = randomNumber + 1;
        high = newHigh - low;
        for(int i = 0; i < newHigh; i++){
            if((low+i) < userGuess ){
                low = low + i;
                high = newHigh - low;
            }
        }
    }
    else if(randomNumber > userGuess){
        cout << "Too high!" << endl;
        high = randomNumber - low;
        for(int i = 0; i < randomNumber-1; i++){
```

Please click on the highlighted coding video link : Problem 3.4 (c)