

Name: Salman Almutairi

ID: 2202117608

Homework: 1

1. Describe the C++ development phases.

1) Analysis and Design

2) Implementation

3) Testing

4) Maintenance

2. Write the size of the following data types.

a. char: 1 byte

b. short: 2 bytes

c. int: 4 bytes

d. long: 8 bytes

e. float: 4 bytes

f. double: 8 bytes

3. Give an example of each data type in Question 2 by declaring and initializing the variables with the proper values.

```
// this program uses the iostream library for input and output
#include <iostream>

// this program uses the std namespace for input and output
using namespace std;

// the main function is where program execution begins
int main(){

    // declaring and initializing char
    char letter = 'a';

    // declaring and initializing int
    int num1 = 1;

    // declaring and initializing short
    short num2 = 37;

    // declaring and initializing long
    long num3 = 92;

    // declaring and initializing float
    float pi1 = 3.14;

    // declaring and initializing double
    double pi2 = 3.14;

    // return 0 indicates successful program execution
    return 0;
}
```

4. We can convert the Fahrenheit degree into Celsius using the following formula:

$$^{\circ}\text{C} = (^{\circ}\text{F} - 32) \times 5/9$$

Also, we can convert the Celsius degree into Fahrenheit using the following formula:

$$^{\circ}\text{F} = ^{\circ}\text{C} \times 9/5 + 32$$

Write a C++ program that reads a temperature value as input and its type (either Celsius “C” or Fahrenheit “F”) and then the program must convert the value to the other type. Examples of a running program:

- a. Enter temperature value: 33.5
Enter temperature type: C
The 33.5 Celsius is equivalent to 92.3 Fahrenheit

- b. Enter temperature value: 77.6
Enter temperature type: F
The 77.6 Fahrenheit is equivalent to 25.3333 Celsius

```
// this program uses the iostream library for input and output
#include <iostream>
```

```
// this program uses the namespace std for input and output
using namespace std;
```

```
// the main function is where program execution begins
int main(){
```

```
    /*double C;
    double F;
    double tmp;
```

```
    cout << "Enter temperature value: ";
    cin >> tmp;
```

```
    cout << "Enter temperature type: "*/
```

```
    // values
    double temp, F, C;
```

```
    // Letters
    char type;
```

```
    // prompt output
    cout << "Enter temperature value: ";
    // prompt input
    cin >> temp;
```

```
    // prompt output
    cout << "Enter temperature type: ";
    // prompt input
    cin >> type;
```

```
    // if statement
    if (type == 'C') {
    // initializing the variable
        F = (temp * 9/5) + 32;
    // output
        cout << "The " << temp << " Celsius is equivalent to " << F << " Fahrenheit";
    }
    if (type == 'F'){
    // initializing the variable
        C = (temp - 32) * 5/9;
    // output
        cout << "The " << temp << " Fahrenheit is equivalent to " << C << " Celsius";
    }
}
```

```
    // return 0 indicates successful program execution
    return 0;
}
```

5. Consider a father has died and left his money to his wife, 3 sons, and 6 daughters. Based on Islamic's Sharia, write a C++ program that takes a none integer value and then computes the inheritance (ثاريما). Your program shall output the share of each of wife, son, daughter, total sons share, and total daughter share. Note that the shares can be computed as follows: the wife has a share of $\frac{1}{8}$ whereas the rest of the share will be divided between the sons and daughter such that sons get double amount of daughters.

Below is an example of a program input/output:

Enter the inheritance value: 1000

The wife share is: 125.000

The share of each son is: 145.830

The total share of sons is: 437.490

The share of each daughter is: 72.920

The total share of daughters is: 437.510

```

// this program uses the iostream library for input and output
#include <iostream>

// this program uses the namespace std for input and output
using namespace std;

// the main function is where program execution begins
int main() {
// declaring the variables
    float inheritance, wife, son, son_all, daughter, daughter_all;

// declaring and initializing the variables
    int num_sons = 3, num_daughters = 6;

// prompt output
    cout << "Enter the inheritance value: ";
// prompt input
    cin >> inheritance;

// calculating wife inheritance
    wife = inheritance * 0.125;

//    son = (7 * inheritance) / 16 / num_sons;
//    daughter_share = (inheritance - wife_share - (2 * son_share * num_sons)) / num_daughters;

// calculating the remanence of the inheritance
    inheritance = inheritance - wife;
// calculating the inheritance of all the sons
    son_all = inheritance / 2;
// calculating the inheritance of all the daughters
    daughter_all = inheritance / 2;
// calculating the inheritance of each son
    son = son_all / 3;
// calculating the inheritance of each daughter
    daughter = daughter_all / 6;

```

```

// output the wife share
    cout << "The wife share is: " << wife << endl;
// output the share of each son
    cout << "The share of each son is: " << son << endl;
// output the total share of sons
    cout << "The total share of sons is: " << son_all << endl;
// output the share of each daughter
    cout << "The share of each daughter is: " << daughter << endl;
// output the total share of daughters is
    cout << "The total share of daughters is: " << daughter_all << endl;

// return 0 indicates successful program execution
    return 0;
}

```

6. Use the table below to convert the GPA into letter grade. Write a C++ program that takes a number with decimals that represents the GPA and then converts it into a grade using if-else statements. The program must output "unknown GPA, exiting program..." to any entered number greater than 4 or less than 1.

GPA Grade

4.0 A

3.67 A 3.33 B+

3.0 B

2.67 B 2.33 C+

2.0 C

1.67 C 1.33 D+

1 D

Examples of program output

- Enter GPA: 3.45

Your grade is A-

- Enter GPA: 0.5

Unknown GPA, exiting program...


```
// this program uses the iostream library for input and output
#include <iostream>

// this program uses the namespace std for input and output
using namespace std;

// the main function is where program execution begins
int main(){
    // declaring the variables
    float gpa;
    // prompt output
    cout <<"Enter GPA: ";
    // prompt input
    cin >> gpa;
    // if statement
    if (gpa > 4 || gpa < 1){
        // output
        cout << "Unknown GPA, exiting program...";
    }
    // else statement
    else if (gpa == 4){
        // output A
        cout <<"your grade is A";
    }
}
```

```

// else statement
    else if (gpa >= 3.67){

// output A-
        cout <<"your grade is A-";}
// else statement
    else if (gpa >= 3.33){

// output B+
        cout <<"your grade is B+";}
// else statement
    else if (gpa >= 3.0){

// output B
        cout <<"your grade is B";}
// else statement
    else if (gpa >= 2.63){

// output B-
        cout <<"your grade is B-";}
// else statement
    else if (gpa >= 2.33){

// output C+
        cout <<"your grade is C+";}
// else statement
    else if (gpa >= 2.0){

// output C
        cout <<"your grade is C";}
// else statement
    else if (gpa >= 1.67){

// output C-
        cout <<"your grade is C-";}
// else statement
    else if (gpa >= 1.33){

// output D+
        cout <<"your grade is D+";}
// else statement
    else{

        cout <<"your grade is D-";

    }

// return 0 indicates successful program execution
    return 0;
}

```