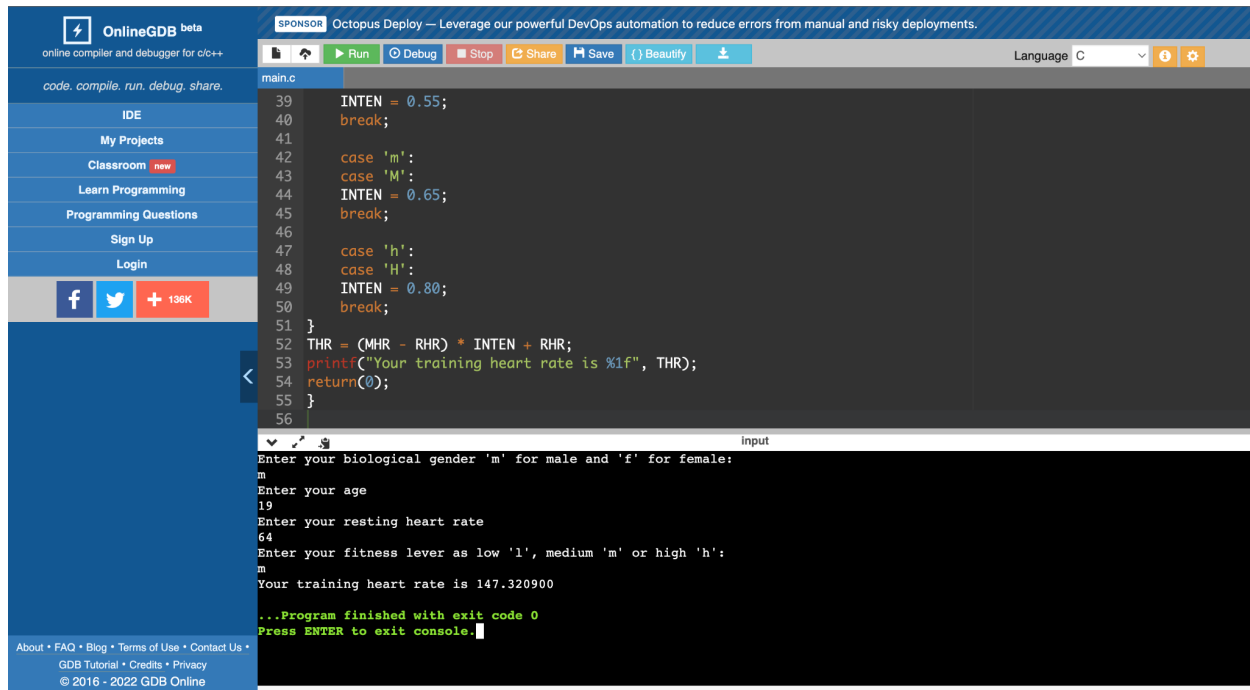


Hamza Ejaz Malik , 501112545

## Problem #1:

(a)



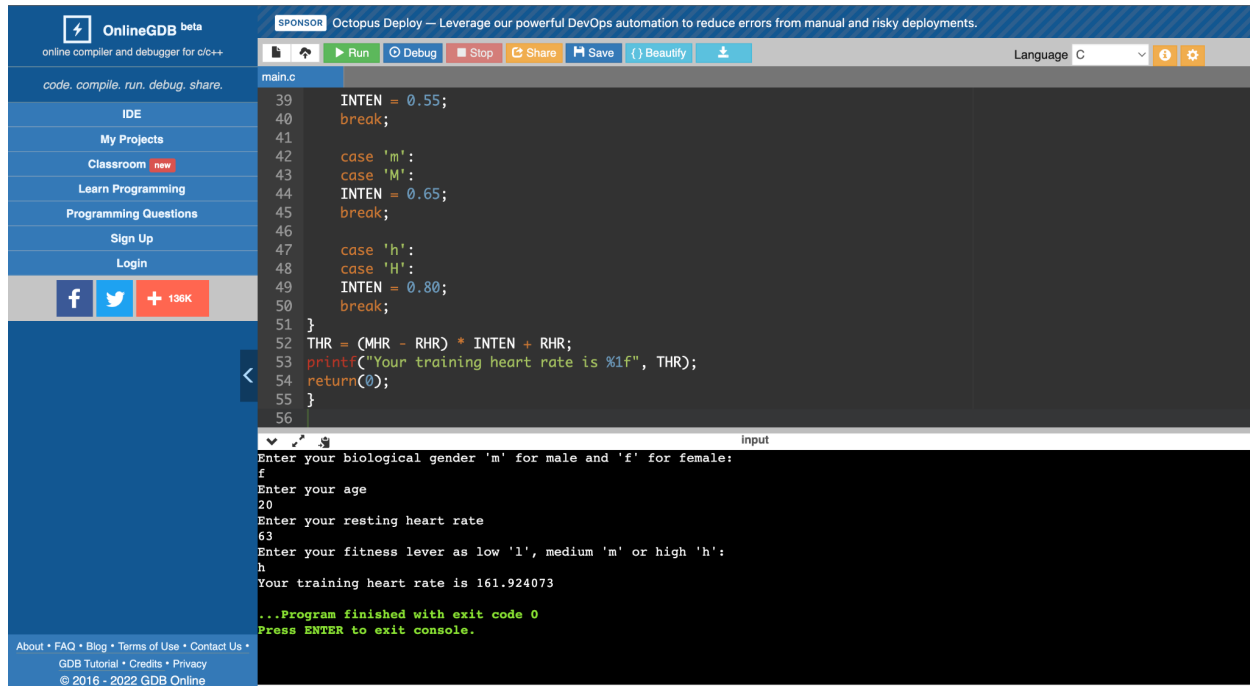
The screenshot shows the OnlineGDB interface. The code in main.c is as follows:

```
39     INTEN = 0.55;
40     break;
41
42     case 'm':
43     case 'M':
44         INTEN = 0.65;
45         break;
46
47     case 'h':
48     case 'H':
49         INTEN = 0.80;
50         break;
51 }
52 THR = (MHR - RHR) * INTEN + RHR;
53 printf("Your training heart rate is %1f", THR);
54 return(0);
55 }
56
```

The console output shows the following interaction:

```
Enter your biological gender 'm' for male and 'f' for female:
m
Enter your age
19
Enter your resting heart rate
64
Enter your fitness lever as low 'l', medium 'm' or high 'h':
m
Your training heart rate is 147.320900
...Program finished with exit code 0
Press ENTER to exit console.
```

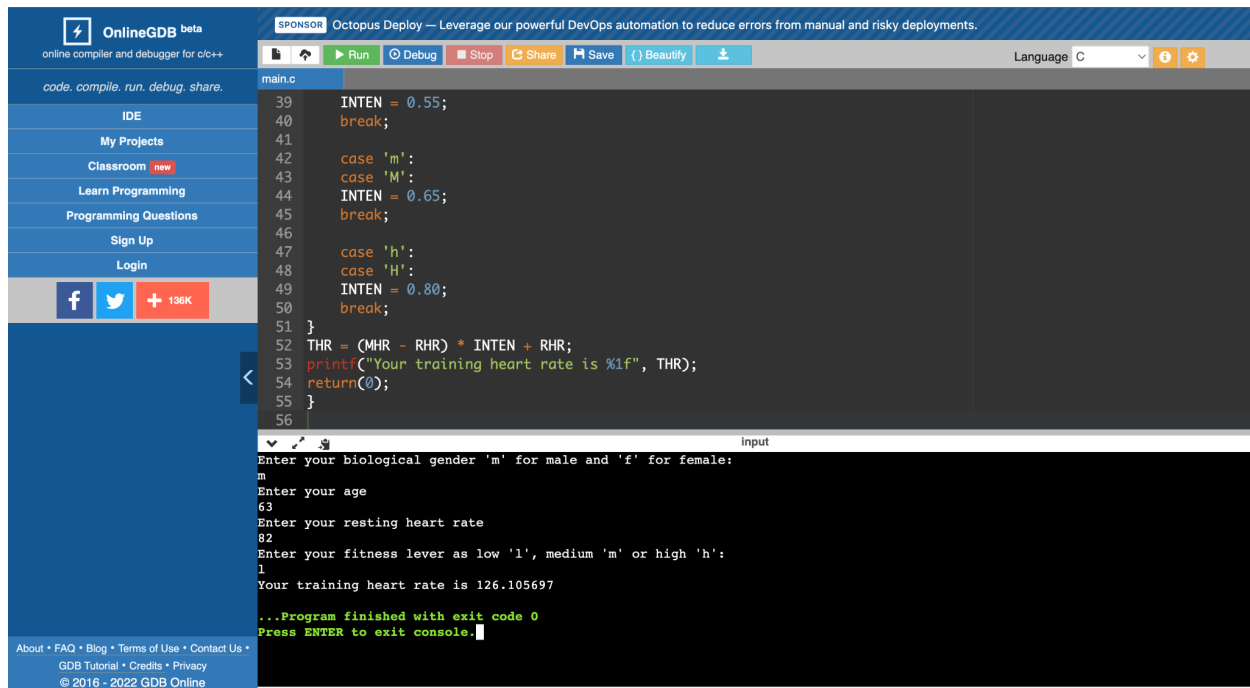
(b)



The screenshot shows the OnlineGDB interface with the same code as in (a). The console output shows a different input sequence:

```
Enter your biological gender 'm' for male and 'f' for female:
f
Enter your age
20
Enter your resting heart rate
63
Enter your fitness lever as low 'l', medium 'm' or high 'h':
h
Your training heart rate is 161.924073
...Program finished with exit code 0
Press ENTER to exit console.
```

(c)



The screenshot shows the OnlineGDB beta web interface. The left sidebar contains navigation links: IDE, My Projects, Classroom (new), Learn Programming, Programming Questions, Sign Up, and Login. Below these are social media icons for Facebook, Twitter, and a '+ 136K' button. The main area displays a C program in a dark-themed editor. The code is as follows:

```
39  INTEN = 0.55;
40  break;
41
42  case 'm':
43  case 'M':
44  INTEN = 0.65;
45  break;
46
47  case 'h':
48  case 'H':
49  INTEN = 0.80;
50  break;
51 }
52 THR = (MHR - RHR) * INTEN + RHR;
53 printf("Your training heart rate is %f", THR);
54 return(0);
55 }
56
```

The console output at the bottom shows the program's execution:

```
Enter your biological gender 'm' for male and 'f' for female:
m
Enter your age
63
Enter your resting heart rate
82
Enter your fitness lever as low 'l', medium 'm' or high 'h':
l
Your training heart rate is 126.105697
...Program finished with exit code 0
Press ENTER to exit console.
```

## Code for problem # 1:

// The heart rate calculated is in bpm

```
#include <stdio.h>
```

```
#include <math.h>
```

```
int
```

```
main(void)
```

```
{
```

```
int age , RHR;
```

```
char gender, fitness;
```

```
double INTEN, MHR, THR;
```

```
//Enter your Gender m or f
```

```
printf ("Enter your biological gender 'm' for male and 'f' for female:\n");
```

```
scanf ("%c", &gender);
```

```
// Enter your age
```

```
printf ("Enter your age\n");
```

```
scanf ("%d", &age);
```

```
// Enter your resting heart rate
```

```
printf ("Enter your resting heart rate\n");
```

```
scanf ("%d", &RHR);
```

```
//Enter your fitness level
```

```
getchar();
```

```
printf("Enter your fitness lever as low 'l', medium 'm' or high 'h': \n");
scanf ("%c", &fitness);
```

```
switch(gender)
{
    case 'm':
    case 'M':
        MHR = 203.7/(1+exp(0.033*(age-104.3)));
        break;

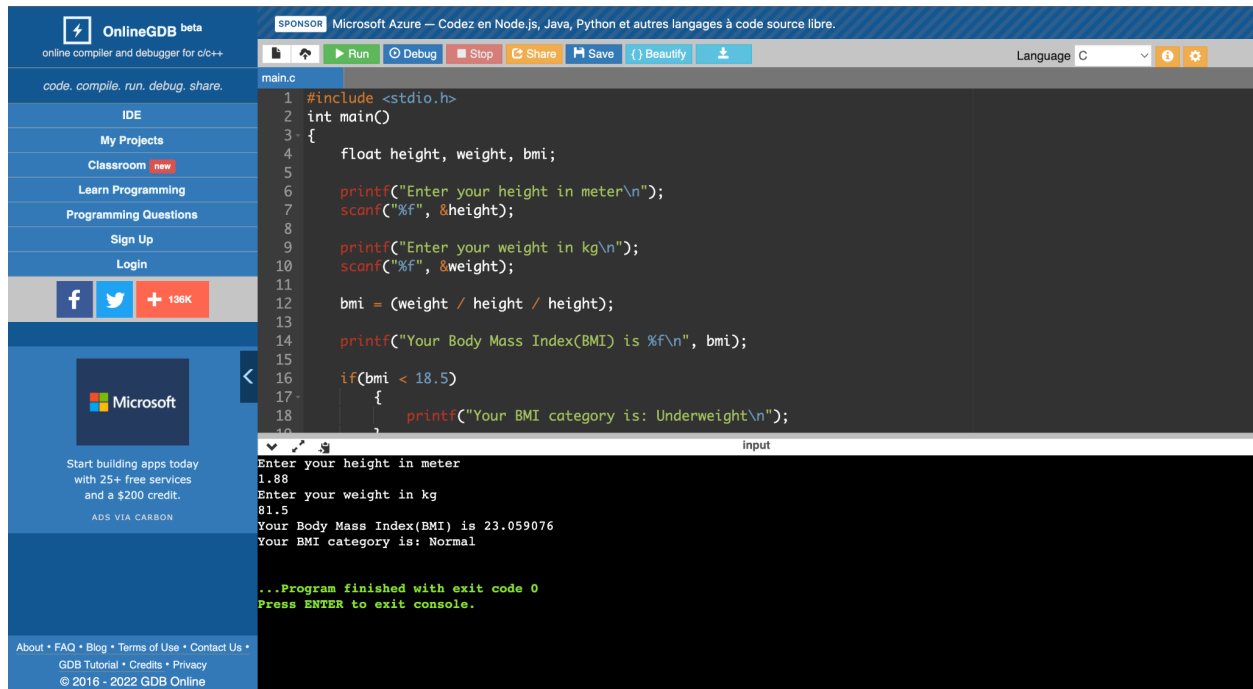
    case 'f':
    case 'F':
        MHR = 190.2/(1+exp(0.0453*(age-107.5)));
        break;
}
switch(fitness)
{
    case 'l':
    case 'L':
        INTEN = 0.55;
        break;

    case 'm':
    case 'M':
        INTEN = 0.65;
        break;

    case 'h':
    case 'H':
        INTEN = 0.80;
        break;
}
// Displays your training heart rate in bpm
THR = (MHR - RHR) * INTEN + RHR;
printf("Your training heart rate is %1f bpm" , THR);
return(0);
}
```

## Problem #2:

(a)



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Language C

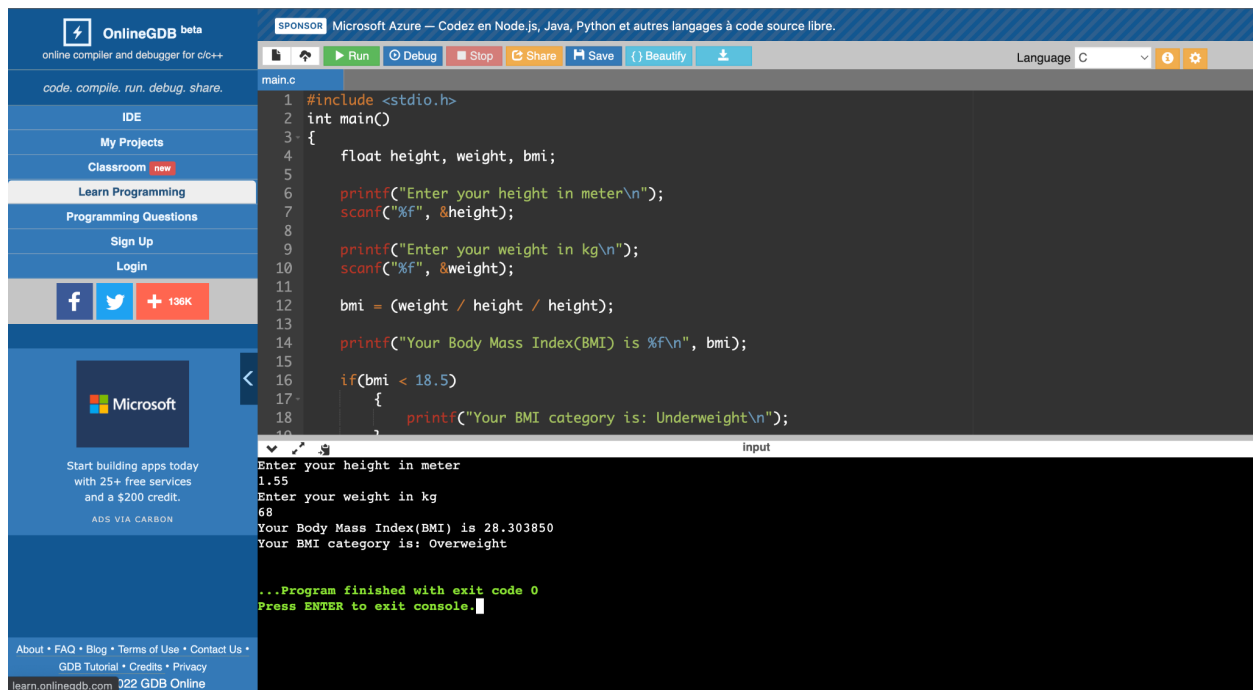
```
1 #include <stdio.h>
2 int main()
3 {
4     float height, weight, bmi;
5
6     printf("Enter your height in meter\n");
7     scanf("%f", &height);
8
9     printf("Enter your weight in kg\n");
10    scanf("%f", &weight);
11
12    bmi = (weight / height / height);
13
14    printf("Your Body Mass Index(BMI) is %f\n", bmi);
15
16    if(bmi < 18.5)
17    {
18        printf("Your BMI category is: Underweight\n");
19    }
20 }
```

Input

```
Enter your height in meter
1.88
Enter your weight in kg
81.5
Your Body Mass Index(BMI) is 23.059076
Your BMI category is: Normal

...Program finished with exit code 0
Press ENTER to exit console.
```

(b)



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Language C

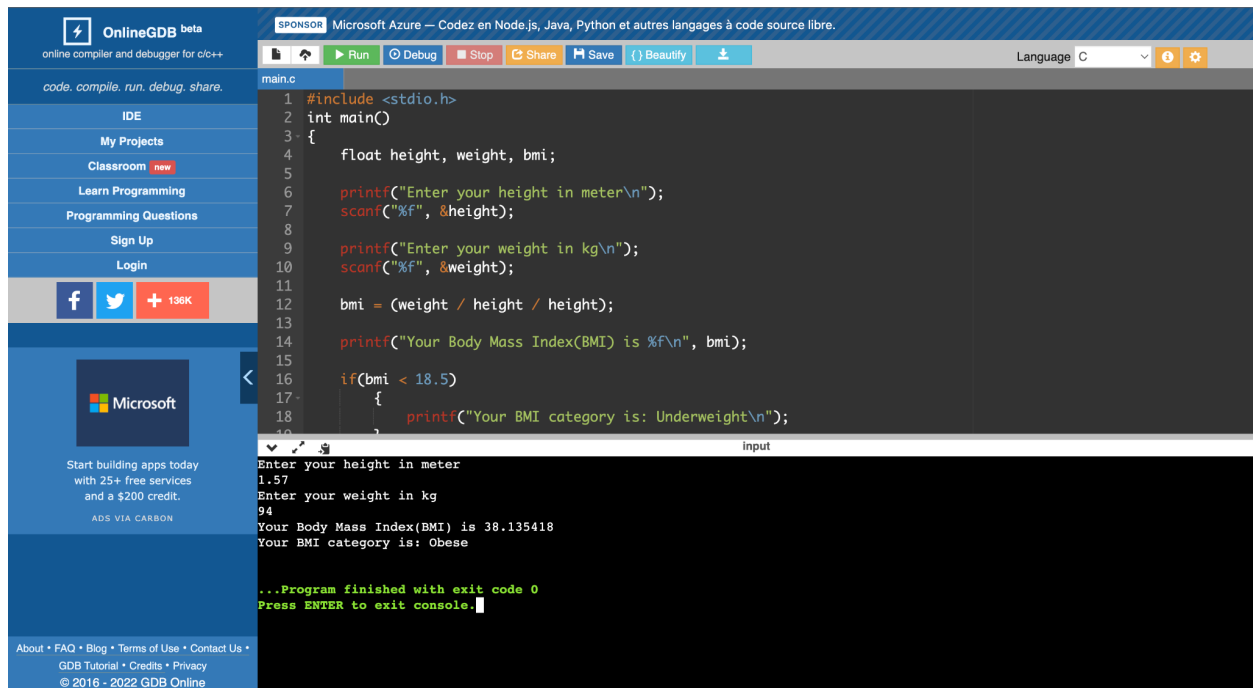
```
1 #include <stdio.h>
2 int main()
3 {
4     float height, weight, bmi;
5
6     printf("Enter your height in meter\n");
7     scanf("%f", &height);
8
9     printf("Enter your weight in kg\n");
10    scanf("%f", &weight);
11
12    bmi = (weight / height / height);
13
14    printf("Your Body Mass Index(BMI) is %f\n", bmi);
15
16    if(bmi < 18.5)
17    {
18        printf("Your BMI category is: Underweight\n");
19    }
20 }
```

Input

```
Enter your height in meter
1.55
Enter your weight in kg
68
Your Body Mass Index(BMI) is 28.303850
Your BMI category is: Overweight

...Program finished with exit code 0
Press ENTER to exit console.
```

(c)



The screenshot displays the OnlineGDB beta web interface. The left sidebar contains navigation links: IDE, My Projects, Classroom (new), Learn Programming, Programming Questions, Sign Up, and Login. Below these are social media icons for Facebook, Twitter, and a +136K badge. A Microsoft advertisement is also present. The main area shows a C program for calculating BMI. The code is as follows:

```
1 #include <stdio.h>
2 int main()
3 {
4     float height, weight, bmi;
5
6     printf("Enter your height in meter\n");
7     scanf("%f", &height);
8
9     printf("Enter your weight in kg\n");
10    scanf("%f", &weight);
11
12    bmi = (weight / height / height);
13
14    printf("Your Body Mass Index(BMI) is %f\n", bmi);
15
16    if(bmi < 18.5)
17    {
18        printf("Your BMI category is: Underweight\n");
19    }
20 }
```

The console output shows the program running with the following input and output:

```
Enter your height in meter
1.57
Enter your weight in kg
94
Your Body Mass Index(BMI) is 38.135418
Your BMI category is: Obese

...Program finished with exit code 0
Press ENTER to exit console.
```

## Code for problem # 2:

```
#include <stdio.h>
int main()
{
    float height, weight, bmi;

    //Enter your height in meters
    printf("Enter your height in meter\n");
    scanf("%f", &height);

    //Enter your weight in kg
    printf("Enter your weight in kg\n");
    scanf("%f", &weight);

    // bmi calculation with weight in kg and height in m
    bmi = (weight / height / height);

    printf("Your Body Mass Index(BMI) is %f\n", bmi);

    if(bmi < 18.5)
    {
        printf("Your BMI category is: Underweight\n");
    }
}
```

```

else if(bmi >= 18.5 && bmi <= 24.9)
{
    printf("Your BMI category is: Normal\n");
}
else if(bmi >= 25 && bmi <= 29.9)
{
    printf("Your BMI category is: Overweight\n");
}
else if(bmi >= 30)
{
    printf("Your BMI category is: Obese\n");
}
else
{
    printf("Wrong entry\n");
}

return 0;
}

```

## Problem 3:

(a)

The screenshot shows the OnlineGDB IDE interface. The code editor contains a C program that calculates the average of quiz grades. The console output shows the program running successfully with the input 10 quizzes and various grades, resulting in an average of 81.156250.

```

1 #include <stdio.h>
2 #include <math.h>
3
4 // Find weight of the quizzes
5 double quizzes(){
6     double sumquizzes, avgquizzes, weightquizzes, quizgrade_Temp;
7
8     int numquizzes=0;
9     //Asks user how many quizzes they have
10    printf("How many quizzes?: ");
11
12    //input for num of quizzes
13    scanf("%d", &numquizzes);
14
15    //intilizaes an array for the quizzes marks which
16    //is the length of the num of quizzes*/
17    double quizzes[numquizzes];

```

Input:

```

How many quizzes?: 10
Enter the grade for quiz 1: 9.5
Enter the grade for quiz 2: 6
Enter the grade for quiz 3: 4
Enter the grade for quiz 4: 10
Enter the grade for quiz 5: 7.8
Enter the grade for quiz 6: 3.4
Enter the grade for quiz 7: 9
Enter the grade for quiz 8: 5.6
Enter the grade for quiz 9: 9
Enter the grade for quiz 10: 10
What is your midterm mark? in percent : 73
What is your final mark? in percent : 84
Your final mark is 81.156250
...Program finished with exit code 0
Press ENTER to exit console.

```

(b)

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main.c

```
1 #include <stdio.h>
2 #include <math.h>
3
4 // Find weight of the quizzes
5 double quizzes(){
6     double sumquizzes, avgquizzes, weightquizzes, quizgrade_Temp;
7
8     int numquizzes=0;
9     //Asks user how many quizzes they have
10    printf("How many quizzes?: ");
11
12    //input for num of quizzes
13    scanf("%d", &numquizzes);
14
15    /*intilizaes an array for the quizzes marks which
16     is the length of the num of quizzes*/
```

Input

```
How many quizzes?: 10
Enter the grade for quiz 1: 9.5
Enter the grade for quiz 2: 8.4
Enter the grade for quiz 3: 9
Enter the grade for quiz 4: 10
Enter the grade for quiz 5: 7.8
Enter the grade for quiz 6: 10
Enter the grade for quiz 7: 9
Enter the grade for quiz 8: 9.6
Enter the grade for quiz 9: 9
Enter the grade for quiz 10: 10
What is your midterm mark? in percent : 89
What is your final mark? in percent : 81
Your final mark is 87.331250

...Program finished with exit code 0
Press ENTER to exit console.
```

(c)

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main.c

```
1 #include <stdio.h>
2 #include <math.h>
3
4 // Find weight of the quizzes
5 double quizzes(){
6     double sumquizzes, avgquizzes, weightquizzes, quizgrade_Temp;
7
8     int numquizzes=0;
9     //Asks user how many quizzes they have
10    printf("How many quizzes?: ");
11
12    //input for num of quizzes
13    scanf("%d", &numquizzes);
14
15    /*intilizaes an array for the quizzes marks which
16     is the length of the num of quizzes*/
```

Input

```
How many quizzes?: 10
Enter the grade for quiz 1: 8.5
Enter the grade for quiz 2: 8.5
Enter the grade for quiz 3: 9
Enter the grade for quiz 4: 8.5
Enter the grade for quiz 5: 7.5
Enter the grade for quiz 6: 7
Enter the grade for quiz 7: 9
Enter the grade for quiz 8: 9.5
Enter the grade for quiz 9: 10
Enter the grade for quiz 10: 10
What is your midterm mark? in percent : 80
What is your final mark? in percent : 70
Your final mark is 78.812500

...Program finished with exit code 0
Press ENTER to exit console.
```

## Code for problem # 3:

//overall mark is in %

```
#include <stdio.h>
```

```
#include <math.h>
```

```

// Find weight of the quizzes
double quizzes(){

double sumquizzes,avgquizzes, weightquizzes, quizgrade_Temp;

    int numquizzes=0;
    //Asks user how many quizzes they have
    printf("How many quizzes?: ");

//input for num of quizzes
    scanf("%d", &numquizzes);

    /*intilizaes an array for the quizzes marks which
    is the length of the num of quizzes*/
    double quizzes[numquizzes];

    /*Initliazes for loop, to go through array,
    then Asks for quiz grade and Stores quiz mark
    in corresponding array index*/
    for(int y=0;y<numquizzes;y++){

        printf("Enter the grade for quiz %d: ", y+1);
        scanf("%lf", &quizgrade_Temp);
        quizzes[y]=(quizgrade_Temp/10)*100;
    }

    for(int x=0;x<numquizzes;x++){
        for(int j=x+1;j<numquizzes;j++){

            if(quizzes[x]>=quizzes[j]){

                double temp=quizzes[x];
                quizzes[x]=quizzes[j];
                quizzes[j]=temp;

            }

        }
    }
}

```



```

    }

    int cancel_2grades=numquizzes-(numquizzes-2);

    for(int y=cancel_2grades;y<numquizzes;y++){
        sumquizzes=sumquizzes+quizzes[y];
    }

    avgquizzes=sumquizzes/(numquizzes-2);

    weightquizzes=(avgquizzes/100)*25;

    return(weightquizzes);
}

struct weights_papers {

    double midtermWeightAchieved, finalWeightAchieved;
};

struct weights_papers papers(){

    double
    midterm,midtermWorth,midtermWeightAchieved,final,finalWorth,finalWeightAchieved;

    //Asks users to input midterm mark %
    printf("What is your midterm mark? in percent : ");
    scanf("%lf", &midterm);

    //Asks users to input final mark %
    printf("What is your final mark? in percent : ");
    scanf("%lf", &final);

    /*If the midterm mark is greater than or equal the final mark,
    then the midterm is worth 35% and the final is 40% */
    if(midterm>=final){

        midtermWorth=35;
        finalWorth=40;

        /*If the final mark is greater than the midterm mark,
        then midterm is worth 25% and the final is 50% */
    }else if(final>midterm){

```

```

        midtermWorth=25;
        finalWorth=50;
    }
    //Calculates weight of midterm acheived
    midtermWeightAchieved=(midterm/100)*midtermWorth;
    //Calculates weight of final acheived
    finalWeightAchieved=(final/100)*finalWorth;

    struct weights_papers s={midtermWeightAchieved,finalWeightAchieved};
    return(s);
}

int main(void){

    double quizzesWeight=quizzes();

    double sum;

    struct weights_papers s=papers();

    //Sums the final grade & prints it
    sum=quizzesWeight+s.midtermWeightAchieved+s.finalWeightAchieved;
    printf("Your final mark is %lf ", sum);
}

```

---

END OF LAB