CPS 188 Lab 3 : Selection Control Structures

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1 Problem Sets

1.1 Problem 1

1.1.1 Computer Program

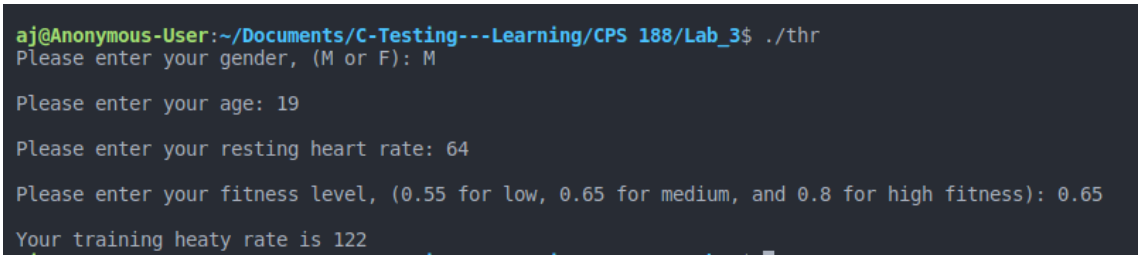
```
/*  Program to calculate the Training Heart Rate (THR)  */

#include <stdio.h>
#include <math.h>
#include <stdbool.h>

float inputs(void);
bool gender_conditional(char gender);
int male_training_heart_rate(int age, int resting_heart_rate,
    float fitness_level);
int female_training_heart_rate(int age, int
   resting_heart_rate, float fitness_level);
int conditional(char gender, int age, int resting_heart_rate,
    float fitness_level);
void output(int training_heart_rate);

void main(void)
{
    float g, a, rhr, fl = inputs();
    int thr = conditional(g, a, rhr, fl);
    output(thr);
}

float inputs(void)
{
    char gender;
    int age;
    int resting_heart_rate;
    float fitness_level;

    /*  Scanning values for gender selection    */
    printf("Please enter your gender, (M or F): ");
    do
    {
        scanf("%c", &gender);
    } while (gender == 'M' || gender == 'F');


    /*  Scanning values for the age */
```

```
37      printf("\nPlease enter your age: ");
38      scanf("%i", &age);
39
40      /*  Scanning values for the resting heart rate  */
41      printf("\nPlease enter your resting heart rate: ");
42      scanf("%i", &resting_heart_rate);
43
44      /*  Scanning values for fitness level   */
45      printf("\nPlease enter your fitness level, (0.55 for low,
        0.65 for medium, and 0.8 for high fitness): ");
46      scanf("%f", &fitness_level);
47
48      return gender, age, resting_heart_rate, fitness_level;
49  }
50
51  int conditional(char gender, int age, int resting_heart_rate,
        float fitness_level)
52  {
53      /*  Conditional to check male or female */
54      bool binary = gender_conditional(gender);
55
56      /*  Conditional for check male or female THR    */
57      int training_heart_rate;
58      if (binary == true)
59      {
60          training_heart_rate = male_training_heart_rate(age,
       resting_heart_rate, fitness_level);
61      }
62
63      else
64      {
65          training_heart_rate = female_training_heart_rate(age,
        resting_heart_rate, fitness_level);
66      }
67
68      return training_heart_rate;
69  }
70
71  void output(int training_heart_rate)
72  {
73      printf("\nYour training heaty rate is %i\n",
       training_heart_rate);
74  }
75
76  bool gender_conditional(char gender)
77  {
78      int binary;
79      if (gender == 'M')
80      {
```

```
81          binary = true;
82      }
83
84      else
85      {
86          binary = false;
87      }
88
89      return binary;
90  }
91
92  int male_training_heart_rate(int age, int resting_heart_rate,
        float fitness_level)
93  {
94      /*  Calculating the maximum heart rate  */
95      float maximum_heart_rate = 203.7 / (1 + exp(0.033 * (age
        - 104.3)));
96
97      /*  Calculating the training heart rate */
98      int training_heart_rate = (maximum_heart_rate -
        resting_heart_rate) * fitness_level + resting_heart_rate;
99
100     return training_heart_rate;
101 }
102
103 int female_training_heart_rate(int age, int
        resting_heart_rate, float fitness_level)
104 {
105     /*  Calculating the maximum heart rate  */
106     int maximum_heart_rate = 190.2 / (1 + exp(0.0453 * (age -
        107.5)));
107
108     /*  Calculating the training heart rate */
109     int training_heart_rate = (maximum_heart_rate -
        resting_heart_rate) * fitness_level + resting_heart_rate;
110
111     return training_heart_rate;
112 }
```

Listing 1.1: *Hello World Program*

1.1.2 Program Output Screenshot



1.2 Problem 2

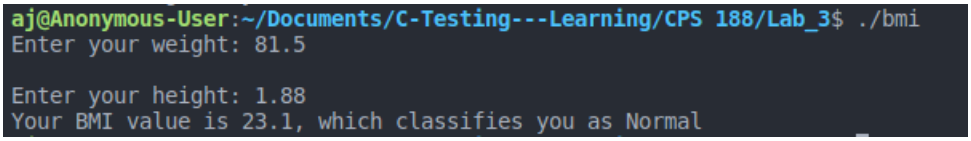
1.2.1 Computer Program

```c
#include <stdio.h>
#include <math.h>
#include <stdbool.h>

float weight_input(void);
float height_input(void);
void output(float weight, float height);

void main(void)
{
    float w = weight_input();
    float h = height_input();
    output(w, h);
}

float weight_input(void)
{
    float weight;

    /*  Scanning values for weight  */
    printf("Enter your weight: ");
    scanf("%f", &weight);

    return weight;
}

float height_input(void)
{
    float height;

    /*  Scanning values for height  */
    printf("\nEnter your height: ");
    scanf("%f", &height);

```

```
35      return height;
36  }
37
38  void output(float weight, float height)
39  {
40      /*  Calculating BMI */
41      height *= height;
42      float body_mass_index = weight / (height);
43
44      /*  Conditional */
45      if (body_mass_index < 18.5)
46      {
47          printf("Your BMI value is %.1f, which classifies you
        as Underweight\n", body_mass_index);
48      }
49      else if (body_mass_index <= 24.9)
50      {
51          printf("Your BMI value is %.1f, which classifies you
        as Normal\n", body_mass_index);
52      }
53      else if (body_mass_index <= 29.9)
54      {
55          printf("Your BMI value is %.1f, which classifies you
        as Overweight\n", body_mass_index);
56      }
57      else
58      {
59          printf("Your BMI value is %.1f, which classifies you
        as Obese\n", body_mass_index);
60      }
61  }
62
```

Listing 1.2: *Program to Calculate the Body Mass Index (BMI) of a person*

1.2.2 Program Output Screenshot



1.3 Problem 3

1.3.1 Computer Program

```
1  /*  Program to Calculate the Overall grades of a Course */
2
```

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

float quiz(void);
float midterm(void);
float final(void);
float conditional_output(float quiz, float midterm, float
    final);

void main(void)
{
    float q = quiz();
    float m = midterm();
    float f = final();
    conditional_output(q, m, f);
}

float quiz(void)
{
    float quiz[10];
    float lowest;
    float sum = 0;

    printf("Enter your quiz marks (0 to 10):\n");
    for (int i = 0; i < 10; i++)
    {
        do
        {
            scanf("%f", &quiz[i]);
            printf("\n");
        } while (quiz[i] < 0 || quiz[i] > 10);
    }

    for (int i = 0; i < 10; i++)
    {
        if (quiz[i] < quiz[i+1])
        {
            lowest = quiz[i];
        }
    }

    for (int i = 0; i < 10; i++)
    {
        sum += quiz[i];
    }

    float average = (sum - lowest) / 9;

    return average;
```

```c
}

float midterm(void)
{
    float marks;

    printf("Enter your midterm marks (0 to 100):\n");
    do
    {
        scanf("%f", &marks);
        printf("\n");
    } while (marks < 0 || marks > 100);

    return marks;
}

float final(void)
{
    float marks;

    printf("Enter your final marks (0 to 100):\n");
    do
    {
        scanf("%f", &marks);
        printf("\n");
    } while (marks < 0 || marks > 100);

    return marks;
}

float conditional_output(float quiz, float midterm, float
   final)
{
    quiz *= 0.25;

    if (midterm >= final)
    {
        midterm *= 0.35;
        final *= 0.4;
    }
    else
    {
        midterm *= 0.25;
        final *= 0.5;
    }

    float grade = quiz + midterm + final;

```

```
98      printf("The overall grade of the course is %.2f\n", grade
        );
99  }
100
101
```

Listing 1.3: *Program to Calculate the Overall grades of a Course*

1.3.2 Program Output Screenshot