CS1010 Programming Methodology
Week 5: Selection Statements and Repetition Statements (Answers)

4. Study the following program **if_to_switch.c**.

   This program differs from the one in question 3 above in that the input is a real number from 0.0 to 100.0. You may assume that the user always enters a non-negative score that is at most 100.0.

```c
// To convert if statement into switch statement.
#include <stdio.h>

int main(void) {
   float score;
   char grade;

   // You may assume score entered is >= 0.0 and <= 100.0
   printf("Enter score: ");
   scanf("%f", &score);

   if (score >= 80.0)
      grade = 'A';
   else if (score >= 60.0)
      grade = 'B';
   else if (score >= 50.0)
      grade = 'C';
   else
      grade = 'F';

   printf("Grade is %c.\n", grade);

   return 0;
}
```

   Convert the **if** statement into a **switch** statement. The challenge here is that the input **score** is a real number. Think about it. If you need help, post on IVLE, in the "Discussion sessions" forum.

   Answer: See **if_to_switch_ans.c**

   Some people feel that this question is not important, as what's learned is of little value. I included this as a continuation of question 3. Feel free to skip this if you wish, and let the students discuss it on IVLE forum.

5. Modularise the **switch_to_if.c** program given in question 3, that is, write a function **compute_grade(int mark)** to take in the mark (an integer) and return the corresponding grade (a character). This function is to be called in the main() function.

    Answer: See **switch_to_if_modularised.c**

    The function should return the grade instead of printing the grade inside it, as to adhere to principle of cohesion as discussed in question 1(e).

6. Given a person's weight in kilograms and height in metres, his/her BMI (Body Mass Index) is calculated based on this formula:

    $$BMI = Weight / Height^2$$

    The following table shows the body types according to a person's gender and BMI:

	Female	Male
Underweight	$BMI \leq 19$	$BMI \leq 20$
Acceptable	$BMI > 19$ and ≤ 24	$BMI > 20$ and ≤ 25
Overweight	$BMI > 24$	$BMI > 25$

    Write a program **bmi.c** to do the following:

    1. Read the user's gender (type int), weight (type double) and height (type double).

    2. Call a function **body_type()** that takes in the above values, and returns the body type which is an integer. You need to find out what are the parameters for this function.

    3. Upon obtaining the body type, display a suitable advice for the user.

    The gender is encoded using the following integers:

    - 0 to represent female
    - 1 to represent male

    The body type is encoded using the following integers:

    - -1 to represent underweight
    - 0 to represent acceptable
    - 1 to represent overweight

    You are to define constants for the above integers, and use the **switch** statement wherever possible.

    Sample runs are shown below:

    ```
    Enter your gender (0 for female, 1 for male): 0
    Enter your weight (kg) and height (m): 62 1.6
    Time to join the gym!
    ```

```
Enter your gender (0 for female, 1 for male): 1
Enter your weight (kg) and height (m): 62 1.6
Great! Maintain it!
```

```
Enter your gender (0 for female, 1 for male): 1
Enter your weight (kg) and height (m): 61.5 1.8
Stuff yourself with more food!
```

Answer:
See **bmi.c**