MTM1511 Programming Language 1

Homework

Handed Out: 12 December 2022 17.00

Due: 31 December 2022 23.59

Hand-in Policy: online.yildiz.edu.tr. No late submissions will be accepted.
Collaboration Policy: No collaboration is permitted.
Grading: This homework will be graded on the scale of 100.

Description: In this homework, you will write a complete C program implement several functions as described below. You are expected to reflect what you have learned in class up to this point.

Q1. [25 Points]

Assume that:
Degree 3 Polynomial: is defined by four numbers as the coefficients of a degree-3 polynomial of the form:

$$P_3(x) = a_3x^3 + a_2x^2 + a_1x + a_0$$

Degree 4 Polynomial: is defined by five numbers as the coefficients of a degree-4 polynomial of the form:

$$P_4(x) = a_4x^4 + a_3x^3 + a_2x^2 + a_1x + a_0$$

The following provides the details of the functions to be implemented:

void write_polynomial3(double a0, double a1, double a2, double a3): Writes the polynomial in a pretty format. No sign replications should be allowed. For example:
write_polynomial3(-1.0,1.0,-3.2,0.0);
should print:

-x^3+x^2-3.2x

void write_polynomial4(double a0, double a1, double a2, double a3, double a4): Writes the polynomial in a pretty format like write_polynomial3.

Q2. [25 Points]

Description: You will write a C file with the main function with additional functions described below. Your Program will start calling part1 and part 2 in that order. For each part, you will receive the inputs from the user and print the output to the console. Details of the parts are further discussed below. Please pay attention to the output format. Any deviation from the shared format may be penalized regardless of the correct execution.

Write a function that will read one integer from the command prompt as term number of Fibonacci Sequence. If the input number is not positive integer value then your program will print the message explaining the reason for ineligibility. Your function will continue until it gets the correct input. Print the Fibonacci Sequence elements as many as the number of input. Let the function continue working until it gets the '*' input.

Example 1:

Please enter term(s) number : -5

Please enter "positive" term(s) number: a

Please enter "numeric" term(s) number:7

Fibonacci Sequence:

1

1

2

3

5

8

13

Function prototype is void calculate_fibonacci_sequence()

Q3. [25 Points]
Write a function that will read one integer from the command prompt. Your second function will decide whether the entered number is Perfect Number and Harmonic Divisor Number. The input must be a natural number. Perfect Number is the number at which the sum of all natural number divisor of a natural number n is equal to itself.(1 included, not including itself). Harmonic Divisor Number or Ore Number is a positive integer whose divisors have a harmonic mean that is an integer. Let the function continue working until it gets the '*' input then end the program.

Function prototype is void decide_perfect_harmonic_number()

Example:

Please enter input number : 6
Natural Number Divisors: 1 , 2 , 3, 6
Is Perfect Number? : Yes
Hint: 1+2+3 = 6 and input 6. That's why it's the perfect number.
Is Harmonic Divisor Number? : Yes
Hint: Number 6 has the four divisors. Their harmonic mean is an integer:
4 / ((1/1) + (1/2) + (1/3) + (1/6)) = 2
Please enter input number : 28
Natural Number Divisors: 1, 2, 4 , 7, 14, 28
Is Perfect Number? : Yes
Hint: 1 + 2 + 4 + 7 + 14 = 28 and input 28. That's why it's the perfect number.
Is Harmonic Divisor Number? : Yes
Hint: Number 28 has the six divisors. Their harmonic mean is an integer:
6 / ((1/1) + (1/2) + (1/4) + (1/7) + (1/14) + (1/28) = 2
Please enter input number : 15
Natural Number Divisors: 1, 3, 5, 15
Hint: 1 + 3 + 5 = 9 but input 15. That's why it's not the perfect number.
Is Perfect Number? : No
Is Harmonic Divisor Number? : No
Hint: Number 15 has the four divisors. Their harmonic mean is not an integer:
4 / ((1/1) + (1/3) + (1/5) + (1/15)) = 1.6

Q4. [25 Points]

Write a function will enter weight and height then calculate BMI(Body Mass Index). Your function will return which category the person belongs to.
Hint: BMI = weight(kg) / $height2(m)$

Function prototype is void bmi_calculation ()

Hint: BMI	**Category**
< 16.0	Severely Underweight
16.0 – 18.4	Underweight
18.5 – 24.9	Normal
25.0 – 29.9	Owerweight
> 30.0	Obese

Example:
Please enter weight(kg) : 65
Please enter height(m): 1.68
Your category: Normal
Hint: $BMI = \frac{65}{1.68^2} = 23.03$, within the normal category.

General Rules:

1. Obey and do not break the function prototypes that are shown on each part, otherwise, you will get zero from the related part.
2. The program must be developed on Dev C++.
3. Note that if any part of your program is not working as expected, then you can get zero from the related part, even it's working in some way.

What to hand in: You should write only a C program that will contaion all four questions. You should call each function (given prototype) in int main() function. Your code name A student with number should hand 21058001.zip (must contain onlu 21058008.c file nothing else) then upload it to online.yildiz.edu.tr for this homework.