National Institute of Technology Calicut
Department of Computer Science and Engineering
B. Tech. (CSE) – First Semester
CS1091E: Programming Laboratory
Problem Set – 6

Submission deadline (on or before):

- 17/10/23, 5:00 PM

Policies for Submission and Evaluation:

- You must submit your programs in the moodle (Eduserver) course page, on or before the submission deadline. Also, ensure that your programs compile and execute without errors in the linux platform. During evaluation, failure to execute programs without compilation errors may lead to zero marks for that program. Detection of ANY malpractice can lead to awarding an F grade in the course.

Naming Conventions for Individual Program

- *PS < PROBLEM_SET_NUMBER > _ < ROLLNO > _ < FIRST − NAME > _ < PROGRAM − NUMBER > . < extension >* (For example: *PS06_BxxyyyyCS_LAXMAN_1.c*). Please make sure that you follow the naming conventions correctly.

Naming Conventions for Submission

- Submit a single ZIP (.zip) file (do not submit in any other archived formats like .rar, .tar, .gz) containing the source code (.c file) for the nine programs. The name of this file must be *PS < PROBLEM_SET_NUMBER > _ < ROLLNO > _ < FIRST − NAME > .zip* (For example: *PS06_BxxyyyyCS_LAXMAN.zip*). DO NOT add any other files (like temporary files, input files, etc.) except your source code, into the zip archive.

Standard of Conduct

- Violations of academic integrity will be severely penalized. Each student is expected to adhere to high standards of ethical conduct, especially those related to cheating and plagiarism. Any submitted work MUST BE an individual effort. Any academic dishonesty will result in zero marks in the corresponding exam or evaluation and will be reported to the department council for record keeping and for permission to assign F grade in the course.

General Instructions

- Programs should be written in C language and compiled using C compiler in Linux platform. Sample inputs are just indicative. **Submit the**

solutions to questions 1 to 9 as a single .zip file through the submission link in Eduserver.

QUESTIONS

Write C programs for the following problems, with the definition and use of the functions indicated.

1. Compute the sum of the digits of a given non negative integer. The integer can be of any length.
   Function: sumDigits() that takes the number as argument and returns the sum of its digits.

   Sample input and output:

   - Input:

     Enter a non-negative integer:8653421

   - Output:

     Sum of digits:29

2. Convert temperature ranging between 30°C and 50°C to the Farenheit scale. The program should print a table displaying temperatures in the two scales side by side ($F = (9/5)C + 32$).
   Function: toFarenheit() that given the temperature in celsius, returns the equivalent Fahrenheit value.

   Sample input and output:

   - Output:

Celsius	Fahrenheit
30	86.00
31	87.80
32	89.60
33	91.40
34	93.20
35	95.00
36	96.80
37	98.60
38	100.40
39	102.20
40	104.00
41	105.80
42	107.60
43	109.40
44	111.20
45	113.00
46	114.80
47	116.60
48	118.40
49	120.20
50	122.00

3. Print the grades of $n > 1$ students, given their marks. Convert marks to grade as per the following grading criterion.

80-100:	A
60-79:	B
50-59:	P
0-49:	F

Function: marksToGrade() that given mark (float) returns the corresponding grade.

Sample input and output:

- Input and Output:

```
Enter the number of students: 4
Enter marks for 4 students:
Enter marks for student 1: 67
Grade for student 1: B
Enter marks for student 2: 89
Grade for student 2: A
Enter marks for student 3: 32
Grade for student 3: F
Enter marks for student 4: 45
Grade for student 4: F
```

4. Compute the weekly salary(float) of $n > 1$ employees, given the number of hours of work per week (int) and the hourly rate(float) for each employee. For the first 40 hours of work, full pay is given and for each extra hour,half pay is given.
   Function: `getWeeklySalary()` that returns the weekly salary, given the required arguments.

   Sample input and output:

   - Input and output:

     ```
     Enter the number of employees: 4
     Enter hours worked and hourly rate for each of 4 employees:
     Enter hours worked for employee 1: 45
     Enter hourly rate for employee 1: 3.9
     Weekly salary for employee 1: 165.750000
     Enter hours worked for employee 2: 12
     Enter hourly rate for employee 2: 68.13
     Weekly salary for employee 2: 817.559937
     Enter hours worked for employee 3: 54
     Enter hourly rate for employee 3: 12.3456
     Weekly salary for employee 3: 580.243225
     Enter hours worked for employee 4: 68
     Enter hourly rate for employee 4: 6.43
     Weekly salary for employee 4: 347.219971
     ```

5. Compute the total price for a list of products sold. Enter product code 0 to terminate iteration. The price per unit is determined based on the following table:

Product Code	Unit Price
1	10
2	15
3	5
4	3
5	12

   Function: `getPrice()` that returns the total price of the product, given the product code and quantity.

   Sample input and output:

   - Input and output:

     ```
      Enter product code and quantity (0 to terminate iteration):
     Product Code: 2
     Quantity: 23.9
     ```

Price for Product 2: 358.500000
Product Code: 5
Quantity: 13.5
Price for Product 5: 162.000000
Product Code: 3
Quantity: 45.9
Price for Product 3: 229.500000
Product Code: 0
Total Price: 750.000000

6. Print all prime numbers in a range entered by the user. For example, if the user enters the lower bound as 2 and upper bound as 10, the program should print all prime numbers between 2 and 10 (both inclusive), i.e. the output should be 2, 3, 5, 7.
   Function: isPrime() that takes a positive non-zero number as argument, and returns 1 if its argument is prime and 0 otherwise.

   Sample input and output:

   - Input:

     Lower Bound: 10, Upper Bound: 20
   - Output:

     Output: Prime numbers in the range 10 to 20: 11, 13, 17, 19

7. Print the factorial of a given non negative integer.
   Function: Recursive function factorial() that given argument n returns $n!$.

   Sample input and output:

   - Input: *8*
   - Output: *40320*

8. Given an integer $n >= 0$, print the nth fibonacci number.
   Function: Recursive function fibonacci() that given an integer argument $n >= 0$, returns the nth fibonacci number.

   Sample input and output:

   - Input: *7*
   - Output: *13*

9. Compute the greatest common divisor (gcd) of two numbers using the Euclid's algorithm.(Given $a >= b >= 0$, if $b = 0$, $gcd(a, b) = a$, otherwise $gcd(a, b)$ is $gcd(b$, a % b)).
   Function: Recursive function gcd() that given two integers a and b, returns the greatest common divisor of a and b.

Sample input and output:

- Input:

  a=48,b=18

- Output:

  GCD of 48 and 18: 6