

## **Home Work Exercise Week 11:**

### **Experiment 1:**

gcd.c

The greatest common divisor of two positive number a and b is the largest integer which divides both a and b. For example,  $\text{gcd}(10,15) = 5$ ,  $\text{gcd}(3,5) = 1$ ,  $\text{gcd}(6,0) = 6$  etc. One can easily write a program to compute the gcd of two numbers using the following trick due to Euclid from 2300 years ago.

Let  $a \geq b$ , then  $\text{gcd}(a,b) = a$  if  $b = 0$  and  $\text{gcd}(a,b) = \text{gcd}(b, a-b)$ .

This can be implemented using recursive function calls.

Write a C program to read two positive integers a and b and display the gcd of a and b. (Initially you can assume that  $a \geq b$ ).

You can read more about this algorithm at [https://en.wikipedia.org/wiki/Euclidean\\_algorithm](https://en.wikipedia.org/wiki/Euclidean_algorithm)

### **Experiment 2.**

Program name: grade.c

The file data02.txt contains the first names of students in a class along with the marks that they obtained in Physics, Chemistry, Mathematics and Biology.

Write a C program to read the input file data02.txt and produce an output file grades02.txt which contains the grades (A, B, C or F) obtained by each of the student in the four subjects. The program should consist of at least two functions apart from main(). The first function average() accepts the starting address of an array of integers and the length of the array and returns a float value equal to the average of the array. The second function grade() accepts a integer as marks and a float as the class average marks and returns a character to denote the grade. (Do not use global variables or arrays). The grading algorithm used for all the subjects is the following.

- If the marks obtained by a student is less than half the class average in that subject, then the grade is F.
- If the marks obtained by a student is at least half the class average, but less than the class average, then the grade is C.
- If the marks obtained by a student is at least the class average, but less than twice the class average, then the grade is B.
- If the marks obtained by a student is at least twice the class average, then the grade is A.

**Experiment 3.**

Program name: cgpa.c

Write a C program to read the output file grades02.txt produced by the previous program and compute the CGPA of each student and store it along with the grades (as the last column in the file cgpa02.txt). A should be considered as 10 grade points, B as 8, C as 6 and F as 0. For example if a student gets A in 3 subjects and B in one, his CGPA is 9.5. The CGPA should be computed using a function which accepts 4 grades (characters) and outputs the CGPA (float).