Question - 1

SCORE: 50 points

Greatest Common Divisor

Recursion Math

The recurrence relation for Greatest Common Divisor (GCD) of two non-negative integers *a* and *b*, not both zero, is given below:

$$\text{GCD}(a,b) = \begin{cases} a, & b = 0 \\ \text{GCD}(b, a\%b), & \text{otherwise} \end{cases}$$

Write a function int gcd(int a, int b) to compute the GCD of *a* and *b*. Skeleton program **GCD.c** is given.

Question - 2

SCORE: 75 points

Power

Recursion Maths

The math function double pow(double x, double y) computes x^y.

Write your own, simpler function double mypow(double x, int n) to compute x^n, where *n* is a non-negative integer.

Skeleton program is given. The recurrence relation is not given. You should derive it before writing the function.

Question - 3

SCORE: 50 points

Sum Digits

Recursion Math

Write a recursive function int sum_digits(int n) that sums up the digits in *n*, assuming that *n* is a non-negative integer.

Skeleton program **SumDigits.c** is given.

Sample runs:

```
Enter a non-negative integer: 6543
Sum of its digits = 18

Enter a non-negative integer: 3708329
Sum of its digits = 32
```

Question - 4

SCORE: 75 points

Help

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Sum Array

Recursion Arrays

Complete the program **SumArray.c** to read data into an integer array with at most 10 elements, and sum up all values in the array, using a recursive function.

Sample runs:

```
Enter number of elements: 6
Enter 6 values: 4 3 -2 0 1 3
Array read: 4 3 -2 0 1 3
Sum = 9

Enter number of elements: 8
Enter 8 values: 11 25 56 8 12 7 31 16
Array read: 11 25 56 8 12 7 31 16
Sum = 166
```

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