High School Programming Competition

Computer Science Department, Saint Anselm College

2009 Problem 1. Circular Permutations

Generate all the circular permutations for a given word (ask for N, N > 1).

Input: Enter word? MARIE

Output:
```
M A R I E
A R I E M
R I E M A
I E M A R
E M A R I
```

2009 Problem 2. The tournament

We have N teams/players. Ask for N. The program should generate all the possible games (where each team plays with each other team just once)

Input: Enter N? 5

Output:
```
#1      1       2
#2      1       3
#3      1       4
#4      1       5
#5      2       3
#6      2       4
#7      2       5
#8      3       4
#9      3       5
#10     4       5
```

2009 Problem 3. Find the 3x3 magic squares

Print all the 3x3 magic squares that contain all of the digits 1-9 (and the sum for each line, column, and diagonal is 15).

Input:

NO input

Output:

1 2 3 (example only - *this square does not satisfy the requirement*)
4 5 6
7 8 9 …

There are ?? magic squares.

2009 Problem 4. The DNA string

Find all the locations of a certain substring and display also how many are found. Given string is: ACGTACGTACGAGTCGTTTTCCCCGGGGACGTACGTAC

Input:

Enter substring? AC

Output:

0 4 28 32 ..
Found = 6

2009 Problem 5. Goldbach's Conjecture

Goldbach's Conjecture **two <u>primes</u>. Write a program that, given a positive even integer, proposes a pair of two prime numbers that add up to it. (Numbers in pairs could repeat)**

Input: Enter number? 14

Output: 14 = 3 + 11 (*also 14 = 7 + 7 is acceptable*)