EE231002 Introduction to Programming

Lab06. Latin Squares

Due: Nov. 14, 2020

A size N Latin Square is an $N \times N$ matrix with each row and colume filled with integers 1 to N without repeat. For example, two size 3 Latin Squares are shown below.

1	2	3
2	3	1
3	1	2

1	2	3
3	1	2
2	3	1

In this lab, you will write a C program to find all size N latin squares given N using exhaustive search. In your program N should be defined as a macro as the following.

```
#define N 5
```

In this way, you can develop your program using a small N such as $N = 3$. Once your are satisfied with your coding, you can enlarge N to test the efficiency of your program. However, when the program is being submitted N should be set to 5.

To facilitate coding for this lab, two global variables can be defined as

```
int A[N][N];     // array to test Latin Squares
int Nsol = 0;    // number of Latin Squares found
```

Example program output assuming $N = 3$ is shown below.

```
$ a.out
Solution 1:
  1 2 3
  2 3 1
  3 1 2
Solution 2:
  ...
  ...
Solution 12:
  3 2 1
  2 1 3
  1 3 2
Total number solutions found: 12
```

Notes.

1. Create a directory **lab06** and use it as the working directory.
2. Name your program source file as **lab06.c**.
3. The first few lines of your program should be comments as the following.

   ```
   // EE231002 Lab06 Latin Squares
   // ID, Name
   // Date:
   ```

4. After finish editing your source file, you can execute the following command to compile it,

   ```
   $ gcc lab06.c
   ```

   If no compilation errors, the executable file, **a.out**, should be generated, and you can execute it by typing

   ```
   $ ./a.out
   ```

5. After you finish verifying your program, you can submit your source code by

   ```
   $ ~ee2310/bin/submit lab06 lab06.c
   ```

   If you see a "submitted successfully" message, then you are done. In case you want to check which file and at what time you submitted your labs, you can type in the following command:

   ```
   $ ~ee2310/bin/subrec lab06
   ```

   It will show the last few submission records.