EE231002 Introduction to Programming

Lab02. Linear System Solution

Due: Sep. 29, 2014

A linear system is given below. Please write a C program to find its solution.

$$
\begin{array}{rrrrrl}
3a+ & 4b+ & 5c+ & 6d+ & 7e & = 78 \\
 & 2b+ & 3c+ & 4d+ & 5e & = 50 \\
 & & c+ & 2d+ & 3e & = 25 \\
 & & & 2d+ & 9e & = 46 \\
 & & & 3d+ & e & = 19
\end{array}
$$

After finding the solution, please verify its correctness. That is, substitute the solution found to the left-hand side of the linear system and print out the right-hand side numbers. These numbers should match with those given above.

The output of your program should have the following format.

```
$ ./a.out
Solution:
  a=x b=xxx c=x d=x e=x
Verification:
  3a+ 4b+ 5c+ 6d+ 7e= 78
      2b+ 3c+ 4d+ 5e= 50
           c+ 2d+ 3e= 25
              2d+ 9e= 46
              3d+  e= 19
```

Notes.

1. Create a directory **lab02** and use it as the working directory.
2. Name your program source file as **lab02.c**.
3. The first few lines of your program should be comments as the following.

   ```
   /* EE231002 Lab02 Linear System Solutions
      ID, Name
      Date:
   */
   ```

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

   ```
   $ gcc lab02.c
   ```

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

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

5. The format of program output has been shown above. Please make sure you follow the format exactly.

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

   ```
   $ ~ee231002/bin/submit lab02 lab02.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:

   ```
   $ ~ee231002/bin/subrec lab02
   ```

   It will show the submission records for lab02.

7. The objectives of this lab are:

   7.1. Get more familiar with the linux system.

   7.2. Practice `vim` editor.

   7.3. Practice solving a linear system using C.

   7.4. Practice formatted output using `printf`.

8. The solution of a two-variable system is known. For example, Given the system below

$$ax + by = c$$
$$dx + ey = f$$

   The solution is

$$x = \frac{ce - bf}{ae - bd}$$
$$y = \frac{af - cd}{ae - bd}$$