

**Homework Project 2**

Given 10/12/2011, Due 10/26/2010

Implement the simplex algorithm to compute the maximum of a linear objective function under a set of linear inequalities.

You should write a function

```
o int simplex(int d, int n, double *A, double *b, double *c,  
              double *result)
```

which has as parameters the number of variables  $d$ , the number of inequalities  $n$ , the coefficient matrix  $A$  and right-hand side  $b$ , the coefficients of the objective function  $c$ , as well as the result vector  $result$ , which contains the optimum values for the  $d$  variables  $x_0, \dots, x_{d-1}$ . It returns an integer, which is the number of simplex steps taken by the algorithm to reach the optimum.

Your function should solve the LP problem

$$\begin{aligned} \max & c[0]x_0 + \dots + c[d-1]x_{d-1} \\ & A[0][0]x_0 + \dots + A[0][d-1]x_{d-1} \leq b[0] \\ & A[1][0]x_0 + \dots + A[1][d-1]x_{d-1} \leq b[1] \\ & \vdots \\ & A[n-1][0]x_0 + \dots + A[n-1][d-1]x_{d-1} \leq b[n-1] \\ & x_0 \geq 0, x_1 \geq 0, \dots, x_{d-1} \geq 0 \end{aligned}$$

Do not make any assumptions on the size of the matrix; any additional storage you need should be allocated dynamically. The programming language is C or C++; test your code before submission using the gcc or g++ compiler. Submit your source code (the function) by mail to [peter@cs.ccny.cuny.edu](mailto:peter@cs.ccny.cuny.edu).