

## Stages

The programming task consists of the following stages:

1. Team up.
2. Search for tools.
3. Specify your linear program that can be solved by Simplex method (not special case).
4. Perform the main task (write program using Simplex method to solve LPP).
5. Test your code.
6. Report by Team leader.
7. Submit to Moodle.

### 1. Team up

In this step, you need to form a team of up to 4 people. The needed way to form a team is to have a team from one group and not from other groups. For example, if you are in DSAI-03, then you can be in a team consists of students from the same group and not from others.

### 2. Search for tools/platform

Here, you need to select a programming language and search for platform. Platform should be free access.

### 3. Specify your linear program

You should find a linear program model that can be solved by Simplex method (not special case). It is recommended to solve LPP, first by hand to be sure that it has a solution.

### 4. Perform the main task

Write a program that implements the simplex method. Pay attention that you are not allowed to use build in functions. You should write an algorithm that can solve LPP using Simplex method. You can find this algorithm in lecture slides or any book related to "Linear Programming".

### 5. Testing

Test your code on different objective functions and constraints (LPP).

### 6. Report by Team leader

Team leader should provide a short report about the contribution of team members. He/she should give grades to team members. Grade range is "0 to 5". "0" means no contribution and "5" means the highest contribution. For example, if all members were active, then the team leader should give "5" to all members.

### 7. Submit to Moodle.

Run your code, create a pdf from it and submit pdf and the link to the repository (for example Github) to Moodle for assessment before the deadline. All members should submit to Moodle before the deadline.

**Notes:**

- You can not solve programming tasks alone. You must be a member of a team.
- You cannot change your team during the whole course.
- Be sure that the link you provide works, otherwise your programming task will not be graded.

**Instructions**

1. The team size is up to 4. Team leader should inform corresponding TA about his/her team. TAs will provide tables to gather information of teams.
2. Select language and platform. TAs will provide tables to gather information of teams.
3. Define the objective function and check that it is linear.
4. Define constraints and check if they are linear.
5. Is the problem in standard form? If no, rewrite the problem in standard form.
6. Write a computer program in any programming language (e.g. Python, C++) to solve the defined system of linear programming with the use of iterative Simplex method.
7. Test on different functions and constraints (5 tests). Use different number of variables and number of constraints.

**Input format**

The input contains:

- A vector of coefficients of objective function -  $C$ .
- A matrix of coefficients of constraint function -  $A$ .
- A vector of right-hand side numbers -  $b$ .
- The approximation accuracy.

**Output format**

The output contains:

- The string "The method is not applicable!"  
or
- A vector of decision variables -  $x^*$ .
- Maximum (minimum) value of the objective function.