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Math170 Term Project
Mathematical Methods for Optimization

There is an interactive canonical LP solver you can download from the class bcourses site. It automatically generates a random LP with a basic feasible solution for the given numbers of constraints and variables, and then solves it. Modify this code so it can solve any given canonical LP with the **Phase I** and **Phase II** solution process.

There are two parts to this project.

1. You should turn in a .m file LPxxx.m which contains a matlab function of the form

   ```
   function [data, info] = LPxxx(A,b,c)
   ```

   to solve a given canonical LP. Here xxx is your student id. On output (case sensitive):

   - If `info.run = Failure`, then
     - `info.msg`: Explain where and how the failure occured
       (in Phase I or Phase II, failure due to arithmetic exceptions or degeneracy)
   - If `info.run = Success`
     - `info.case = 1, 2, 3`, for LP feasible with optimal solution, LP feasible without optimal solution, or LP infeasible.
     - Whenever applicable,
       (a) For **Phase I**:
         * `data.PhaseI.obj` = the optimal objective value
         * `data.PhaseI.x` = optimal primal solution as column vector.
       (b) For **Phase II**:
         * `data.PhaseII.Primalobj, data.PhaseII.Dualobj` = the optimal objective values
         * `data.PhaseII.x, data.PhaseII.y, data.PhaseII.z` = optimal primal and dual solutions, as column vectors, with $\mathbf{z} = \mathbf{c} - A^T\mathbf{y} \geq \mathbf{0}$.
         * In case 2, `data.PhaseII.x` and `data.PhaseII.t` are a basic feasible solution and a search direction in which the object value approaches $-\infty$ with feasible solution `data.PhaseII.x`$-\lambda*$`data.PhaseII.t`.
       (c) `info.PhaseI.loop, info.PhaseII.loop` should contain numbers of steps in Phase I and Phase II loops.

2. Use your code to solve George Stigler's Diet Problem as developed in his paper, accessible on the class bcourses site. Take your input data from Table 1 and Table A. Output the optimal diet and associated daily cost.

Due Monday April 13, 2020 on `gradescope`.