Math 313 **Dietary Project** **Directions: Part 1**

Due: 14 November 2021

This linear programming project is to design a diet which meets the minimum recommended daily nutrition goals according to the U.S. Department of Health and Human Services Office of Disease Prevention and Health Promotion. A pdf file of *"Nutritional Goals for Age-Sex Groups"* have been uploaded into the course website in Canvas in a module called Dietary Project. This document provides guidelines on the minimum or maximum amounts of nutrients in the categories 'Macronutrients', 'Minerals' and 'Vitamins' by gender and age groupings.

Directions for the First Installment of the Project

- Pick a restaurant that provides nutritional information about each (most) of their dishes and drinks that will be the focus of the project. You may choose to use a limited menu for your solution from all the available menu selection. (Many fast food establishments have this readily available online.)
- Pick a gender for whom to create a diet.
- Pick an age group for whom to determine the diet.
- Use data for all nutrients from the following three nutrient groups that are made available by your choice of restaurant to determine restrictions on the numbers and choices of dishes selected for the diet.
  - Macronutrients:
    - either Protein (g) or Protein (% kcal);
    - either Carbohydrate (g) or Carbohydrate (% kcal);
    - Dietary Fiber (g);
    - Added Sugars (% kcal);
    - Total Fat (% kcal); and
    - Saturated Fat (% kcal);
  - Minerals:
    - Calcium (mg);
    - Iron (mg);
    - Sodium (mg);
  - Vitamins:
    - Vitamin A (mcg RAE);
    - Vitamin C (mg);
    - Vitamin D (IU).
- Write an introduction to the project which
  - describes the goal of the project to a general reader;
  - identifies the restaurant (providing the nutritional information in an appendix); and
  - identifies the gender and age choices.
- Determine the linear program which will be used to determine a meal plan that satisfies the daily guidelines at a minimal cost. Be sure to define your variables clearly and explain the constraints and objective function (provide the costs associated with the dishes in an appendix).

The ultimate result of the project will be a report which provides a recommended daily meal plan at a minimal cost. The report is to be aimed at a general technically literate audience who may not be expert at linear programming. It is, however, expected to provide some technical sections which develop a linear program to minimize the cost while meeting the guidelines and further duality and sensitivity analyses of your solution (each of these parts are assigned in a separate Project part to be submitted later).

To share the load and provide extra pairs of eyes checking the details, you may work in a group of 2 students throughout this project of 4 parts. In such case you are asked to specify your co-author your approximate contribution to the project components in percentage terms in each submission.