

## CS 312: Algorithm Analysis

### Homework Assignment #18

**Question 1** (10 points) Question 7.16 from the book – In this case you create a salad with any combination of fractional units of the ingredients (where a basic unit is 100g of the ingredient). Discuss what web application you used and how easy it was to use.

**Question 2** (10 points) Solve the following using the simplex algorithm using the steps discussed in section 3.1 of the LP notes and also in class and the slides. Show your work with all the intermediate steps including the new equations for the objective and constraint equations after each pivot. Hint: If an  $x_e$  variable has a positive coefficient within a constraint equation, then that equation will not constrain  $x_e$ . It will happen at least once in this problem.

You are doing bulk shopping for ice cream (C), broccoli (B), and hot dogs (H). Use variable names C, B, and H for these variables, and  $s_1$ ,  $s_2$ , etc. for any slack variables you create. You can buy fractional portions of any item. You have \$20 available. The price of a basic unit of each item is \$5, \$4, and \$2 respectively. The satisfaction gained from a unit of each item is 8, 2, and 3 respectively. You cannot have more than 3 units of Ice Cream. Your total units of all items combined cannot exceed 6. Your goal is to maximize satisfaction within the constraints. When you have a choice of a variable to use at any point in the algorithm, choose the variable earliest in the alphabet.