

IE 407 - FUNDAMENTALS OF OR | FALL 2022

HOMEWORK 3

Due: 17.00 on January 3rd, 2023

YumChips has two top selling flavors 'Sweet Corn' and 'Barbeque'. Due to the market search of the marketing team, the firm realized that there is a demand for a new 'Mix of Bests' chips which will be a mixed product of a combination of 'Sweet Corn' and 'Barbeque' flavored chips. One package (100 g) of 'Sweet Corn' flavored chips contains 1.5 g protein and 400 calories. One package (100 g) of 'Barbeque' flavored chips contains 3.5 g protein and 600 calories. YumChips' marketing department has decided that each package (100 g) of 'Mix of Bests' must have at most 550 calories, at least 2.5 g protein, and the grammage difference of two types must be less than or equal to 35 g. It costs YumChips 5¢ to produce 10 g of 'Sweet Corn' flavored chips and 7¢ to produce 10 g of 'Barbeque' flavored chips.

1. Formulate a linear programming model to determine how YumChips can meet the marketing department's requirements at minimum cost and solve the model by using the Simplex method.
2. Solve the model formulated in part (1) by using a software to verify your solution in part (1).
3. What if the required protein amount per package of 'Mix of Bests' is at least 2.75 g? Solve by both Simplex method and a software program.
4. Find the shadow price of the protein constraint by using the final tableau of the simplex method in part (1) first, and then by using the sensitivity analysis report of the software program in part (2).
5. Is there a shadow price (other than 0) for another constraint? If yes, find the shadow price of the constraint by using the final tableau of the simplex method in part (1) first, and then by using the sensitivity analysis report of the software program in part (2). If no, explain why.