Cutting cafeteria costs essay sample

Nutrition

A cafeteria at All--State University has one special dish it serves like clockwork every Thursday at noon. This supposedly tasty dish is a casserole that contains sautéed onions, boiled sliced potatoes, green beans, and cream of mushroom soup. Unfortunately, students fail to see the special quality of this dish, and they loathingly refer to it as the Killer Casserole. The students reluctantly eat the casserole, however, because the cafeteria provides only a limited selection of dishes for Thursday’s lunch (namely, the casserole). Maria Gonzalez, the cafeteria manager, is looking to cut costs for the coming year, and she believes that one sure way to cut costs is to buy less expensive and perhaps lower quality ingredients. Because the casserole is a weekly staple of the cafeteria menu, she concludes that if she can cut costs on the ingredients purchased for the casserole, she can significantly reduce overall cafeteria operating costs. She therefore decides to invest time in determining how to minimise the costs of the casserole while maintaining nutritional and taste requirements. Maria focuses on reducing the costs of the two main ingredients in the casserole, the potatoes and green beans.

These two ingredients are responsible for the greatest costs, nutritional content, and taste of the dish. Maria buys the potatoes and green beans from a wholesaler each week. Potatoes cost $0. 40 per pound (lb), and green beans cost $1. 00 per lb. All--State University has established nutritional requirements that each main dish of the cafeteria must meet. Specifically, the dish must contain 180 grams (g) of protein, 80 milligrams (mg) of iron, and 1, 050 mg of vitamin C. For simplicity when planning, Maria assumes that only the potatoes and green beans contribute to the nutritional content of the casserole. Because Maria works at a cutting--edge technological

university, she has been exposed to the numerous resources on the World Wide Web. She decides to surf the Web to find the nutritional content of potatoes and green beans.

Her research yields the following nutritional information about the two ingredients. Nutrient Potatoes Green Beans Protein 1. 5 g / 100g 5. 67 g / 10 oz Iron 0. 3 mg / 100 g 3. 402 mg / 10 oz Vitamin C 12 mg / 100 g 28. 35 mg / 10 oz (There are 28. 35 g in one ounce, and 16 ounces in one pound) Edson Branner, the cafeteria cook who is surprisingly concerned about taste, informs Maria that an edible casserole must contain at least a six--to--five ratio in the weight of potatoes to green beans. Given the number of students who eat in the cafeteria, Maria knows that she must purchase enough potatoes and green beans to prepare a minimum of 10 kilograms (kg) of casserole each week. (There are 1, 000 g in one kg.) Again, for simplicity in planning, she assumes that only the potatoes and green beans determine the amount of casserole that can be prepared. Maria does not establish an upper limit on the amount of casserole to prepare since she knows all leftovers can be served for many days thereafter or can be used creatively in preparing other dishes.

a. Determine the amount of potatoes and green beans Maria should purchase each week for the casserole to minimise the ingredient costs while meeting nutritional, taste, and demand requirements. Before she makes her final decision, Maria plans to explore the following questions independently, except where otherwise indicated. b. Maria is not very concerned about the taste of the casserole; she is only concerned about meeting nutritional requirements and cutting costs. She therefore forces Edson to change the

recipe to allow only for at least a one--to--two ratio in the weight of potatoes to green beans. Given the new recipe, determine the amount of potatoes and green beans Maria should purchase each week. c. Maria decides to lower the iron requirement to 65 mg since she determines that the other ingredients, such as the onions and cream of mushroom soup, also provide iron. Determine the amount of potatoes and green beans Maria should purchase each week given this new iron requirement.

To answer this part, first conduct sensitivity analysis to check whether the part--a solution still remains optimal. If it is not, then you must find a new one. d. Maria learns that the wholesaler has a surplus of green beans and is therefore selling the green beans for a lower price of $0. 50 per lb. Using the same iron requirement from part c and the new price of green beans, determine the amount of potatoes and green beans Maria should purchase each week. To answer this part, first conduct sensitivity analysis to check whether the part--c solution still remains optimal. If it is not, then you must find a new one. e. Maria decides that she wants to purchase lima beans instead of green beans since lima beans are less expensive and provide a greater amount of protein and iron than green beans. Maria again wields her absolute power and forces Edson to change the recipe to include lima beans instead of green beans.

Maria knows she can purchase lima beans for $0. 60 per lb from the wholesaler. She also knows that lima beans contain 22. 68 g of protein and 6. 804 mg of iron per 10 ounces of lima beans and no vitamin C. Using the new cost and nutritional content of lima beans, determine the amount of potatoes and lima beans Maria should purchase each week to minimise the

ingredient costs while meeting nutritional, taste, and demand requirements. The nutritional requirements include the reduced iron requirement from part c. f. Will Edson be happy with the solution in part e?

Why or why not? g. An All--State student task force meets during Body Awareness Week and determines that All--State University’s nutritional requirements for iron are too lax and that those for vitamin C are too stringent. The task force urges the university to adopt a policy that requires each serving of an entrée to contain at least 120 mg of iron and at least 500 mg of vitamin C. Using potatoes and lima beans as the ingredients for the dish and using the new nutritional requirements, determine the amount of potatoes and lima beans Maria should purchase each week. In each part you must: • Define decision variables and describe the mathematical model; and • Except part f, write a recommendation to the problem by including the total cost, the amount of each casserole’s ingredient, and the amount of each nutrient.