Assignment 12

You are to submit this assignment in paper.

Academic misconduct policy: you must not submit another person's assignment.

Model 1: A restaurant offers a fixed menu for each day of the week. Each menu offers a set of dishes, and each dish has a price. Starting at the beginning of the week, the restaurant has a fixed quantity of each dish. Each day, the restaurant sells a fixed number of each dish. The restaurant makes a profit if the total revenue from the sale of dishes is greater than or equal to the total cost of the dishes sold. Assume that the restaurant operates for 5 days a week and that the fixed quantity of each dish is sufficient to cover the demand for that day.

(a) Formulate the problem as a linear programming problem.

(b) Describe a dual problem for the linear programming problem described in (a).

(c) Explain why the dual problem is as useful as the primal problem.

Model 2: Consider a company that produces two types of products, A and B. The company has a fixed budget of $1000 for the production of these products. Each unit of product A requires $10 in raw materials and 2 hours of labor, while each unit of product B requires $20 in raw materials and 1 hour of labor. The company wants to maximize its profit, which is $15 per unit for product A and $25 per unit for product B. The company has a maximum of 200 units of product A and 150 units of product B that can be produced. Formulate the problem as a linear programming problem.

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(b) Describe a dual problem for the linear programming problem described in (a).

(c) Explain why the dual problem is as useful as the primal problem.