**ANLY500 Homework 9**

You can use R or any other appropriate software for this homework

13.1. Valencia Products makes automobile radar detectors and assembles two models: LaserStop and SpeedBuster. The firm can sell all it produces. Both models use the same electronic components. Two of these can be obtained only from a single supplier. For the next month, the supply of these is limited to 4,000 of component A and 3,500 of component B. The number of each component required for each product and the profit per unit are given in the table.

|  | **Components Required/Unit** | |  |
| --- | --- | --- | --- |
|  | **A** | **B** | **Profit/unit** |
| LaserStop | 18 | 6 | $24 |
| SpeedBuster | 12 | 10 | $40 |

1. Identify the decision variables, objective function, and constraints in simple verbal statements.
2. Mathematically formulate a linear optimization model.

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| Functions for these constraints:  18L + 12S <=4000  6L + 10S <= 3500  We need to maximize profit P = 24L+40S |

13.3. Burger Office Equipment produces two types of desks, standard and deluxe. Deluxe desks have oak tops and more-expensive hardware and require additional time for finishing and polishing. Standard desks require 70 board feet of pine and 10 hours of labor, whereas deluxe desks require 60 board feet of pine, 18 square feet of oak, and 15 hours of labor. For the next week, the company has 5,000 board feet of pine, 750 square feet of oak, and 400 hours of labor available. Standard desks net a profit of $225, and deluxe desks net a profit of $320. All desks can be sold to national chains such as Staples or Office Depot.

1. Identify the decision variables, objective function, and constraints in simple verbal statements.
2. Mathematically formulate a linear optimization model.

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| Functions for these constraints:  70S + 60D <= 5000  18D <= 750  10S + 15D <= 400  We need to maximize profit P = 225S + 320D |

13.9. For the Valencia Products model in problem 13.1, graph the constraints and identify the feasible region. Then identify each of the corner points and show how increasing the objective function value identifies the optimal solution.

13.24. Malloy Milling grinds calcined alumina to a standard granular size. The mill produces two different size products from the same raw material. Regular Grind can be produced at a rate of 10,000 pounds per hour and has a demand of 400 tons per week with a price per ton of $900. Super Grind can be produced at a rate of 6,000 pounds per hour and has demand of 200 tons per week with a price of $1,900 per ton. A minimum of 700 tons has to be ground every week to make room in the raw material storage bins for previously purchased incoming raw material by rail. The mill operates 24/7 for a total of 168 hours/week.

1. Develop and solve a linear optimization model to determine the number of tons of each product to produce each week to maximize revenue.
2. If the price per ton for Super Grind is decreased to $1400 because of low demand, how will the solution change?