

MATH 1324: Mathematics for Business & Social Sciences
Signature Assignment

Directions: Please read and complete the following on a separate sheet of paper. Clearly explain your answers, using your own words.

“Woody’s Furniture Manufacturing”
An application in resource allocation and linear programming

Woody’s Furniture Manufacturing Company produces tables and chairs. A table requires 8 labor hours for assembling and 2 labor hours for finishing. A chair requires 2 labor hours for assembling and 1 labor hour for finishing. The maximum number of labor hours available per day are 400 hours for assembling and 120 hours for finishing.

1. Let x represent the number of tables produced per day by Woody’s Furniture Manufacturing Company, and let y represent the number of chairs produced per day. Write a system of four linear inequalities involving x and y that, when solved, give the set of all ordered pairs (x, y) of number of tables and number of chairs that Woody’s company can produce per day, given the constraints above. Next to each inequality, write a brief description or interpretation of its meaning.
2. Carefully graph the system of linear inequalities *on a separate sheet of graph paper* and then shade the feasible region. Is it bounded or unbounded? Identify and label on your graph the coordinates of each of the corner points. Be sure to attach the graph when you submit your work.
3. For each of the following solutions, determine whether or not it is a *feasible solution* to the Woody’s Furniture Manufacturing Company problem. Show your work and explain your reasoning.
 - (a). 20 tables per day, 80 chairs per day
 - (b). 50 tables per day, 50 chairs per day
 - (c). 0 tables per day, 0 chairs per day
 - (d). -15 tables per day, -20 chairs per day
 - (e). 5 tables per day, 100 chairs per day
 - (f). 45 tables per day, 30 chairs per day
4. Suppose that each table produced and sold yields a \$60 profit and each chair produced and sold yields a \$20 profit.
 - (a). An *isoprofit line* is a line of solution points (x, y) within the feasible region that each yield the same profit. Find two feasible solutions to the Woody’s Furniture Manufacturing Company problem that produce a total profit of \$900, and then find two feasible solutions that produce a total profit of \$2,100. Explain your answers, and then draw these two isoprofit lines on your graph — one for a total profit of \$900, and the other for a total profit of \$2,100.
 - (b). *Finding an optimal solution:* How many tables and chairs should Woody’s company produce each day so as to *maximize* its daily profit? What is Woody’s maximum daily profit? Explain your answers.