MA110 Chapter 5 First & Last Name_____
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Directions for each problem: **Step 1**: Assign variables to the unknowns**. Step 2**: Write the objective function. **Step 3**: Write the problem constraints. **Step 4**: Graph the feasible region. **Step 5**: Evaluate the objective function at each of the corner points**. Step 6**: Determine the solution and write your results using a complete sentence and correct units.

1. A furniture manufacturing company manufactures tables and chairs. The relevant manufacturing data are given in the table below. How many tables and chairs should be manufactured each day to maximize profit? What is the maximum profit?

Department	**Table** **Labor-Hours per Unit**	**Chair** **Labor-Hours per Unit**	**Maximum Labor-Hours** **Available per Day**
Assembly	8	2	400
Finishing	2	1	120
Profit per unit	$90	$25	

2. A fruit grower uses two types of fertilizer in an orange grove, brand A and brand B. Each bag of brand A contains 8 pounds of nitrogen, 4 pounds of phosphoric acid and 2 pounds of chloride. Each bag of brand B contains 3 pounds of nitrogen, 4 pounds of phosphoric acid and 1 pound of chloride. The orange grove needs at least 1000 pounds of phosphoric acid and at most 400 pounds of chloride. If the grower wants to maximize the amount of nitrogen added to the grove, how many bags of each mix should be used? How much nitrogen is this?

3. A dietitian in a hospital is to arrange a special diet compose of two basic foods. The diet must include the minimum daily requirements for calcium, iron and vitamin A, which are summarized in the table below. How many ounces of each food must be used to meet the dietary requirements and minimize the cholesterol intake? What is this minimum cholesterol intake?

Nutrient	**Food A** Units per Ounce	**Food B** Units per Ounce	**Minimum** **Daily Requirements**
Calcium	30	10	360
Iron	10	10	160
Vitamin A	10	30	240
Cholesterol	8	4	

4. A manufacturer of lightweight mountain tents makes a standard model and an expedition model for national distribution. Each standard tent requires 1 labor-hour from the cutting department and 3 labor-hours from the assembly department. Each expedition tent requires 2 labor-hours from the cutting department and 4 labor-hours from the assembly department. The maximum labor-hours in the cutting and assembly departments are 32 and 84, respectively. If the company makes a profit of $50 on each standard tent and $80 on each expedition tent, how many tents of each type should be manufactured each day to maximize the daily profit?
5. A patient in a hospital is required to have at least 84 units of drug *A* and 120 units of drug *B* each day (Assume an overdosage of either is harmless). Each gram of substance *M* contains 10 units of drug *A* and 8 units of drug *B*, and each gram of substance *N* contains 2 units of drug *A* and 4 units of drug *B*. Now, suppose that both *M* and *N* contain an undesirable drug *D*, 3 units per gram in substance *M* and 1 unit per gram in substance *N*. How many grams of each substance *M* and *N* should be mixed to meet the minimum daily requirements and at the same time minimize the intake of drug *D*?