

1. A company makes two types of graphing calculators, a deluxe model and a standard model. Each deluxe model requires one plastic case and 20 microcircuits. Each standard model requires 1 plastic case and 10 microcircuits. The company has 2200 plastic cases and 35,000 microcircuits available. In addition, because of orders already placed by the company's customers, the number of deluxe models produced must be at least 450. The profit for each deluxe model is \$24 and the profit for each standard model is \$18. The goal will be to determine how many of each calculator the company should manufacture for maximum profit.

In order to solve this problem, we must do are the following:

- (a) Select a variable to represent the number of deluxe models and a variable to represent the number of standard models that the manufacturer should produce.
- (b) Set up a chart to organize the information given in the problem.
- (c) Use the chart you set up in part (b) to help you to write a system of inequalities in terms of the variables you selected in part (a) expressing the given restrictions. ***Be sure to include in your system an inequality that expresses the restriction concerning orders already placed for the deluxe models, as well as inequalities that are necessary to guarantee that no negative values can be used for the variables.***
- (d) The ***objective function*** is the expression to be maximized or minimized. In this problem, it represents the profit. Write the objective function for this problem.
- (e) On graph paper, make a neat graph of the feasible region for the system of inequalities

found in part (c) and find the coordinates of the corner points of the feasible region.

- (f) The maximum or minimum of the objective function will occur at a corner point of the feasible region. Therefore, to determine the maximum or minimum, we must determine the value of the objective function at each corner point. Determine these values and fill in the chart below.

Corner Points	Objective Function:

- (g) In a sentence, state how many of each calculator should be produced to make the largest possible profit.

- (h) What is the amount of the largest possible profit?

2. A dietician is blending two foods for a special diet. Food I has 30 units of vitamin A and 90 units of vitamin B complex per kilogram. Food II has 40 units of vitamin A and 50 units of vitamin B complex per kilogram. Due to a current shortage of Food II, the dietician cannot purchase more than 45 kilograms of Food II. The mixture is to have at least 1200 units of vitamin A and at least 2970 units of vitamin B complex. Food I costs \$2.60 per kilogram and Food II costs \$3.30 per kilogram. The goal will be to determine how many kilograms of each food should be purchased to minimize cost.

- (a) Select variables to represent the number of kilograms of Food I that should be purchased and the number of kilograms of Food II that should be purchased.

- (b) Set up a chart to organize the information given in the problem.

- (c) Use the chart you set up in part (b) to help you to write a system of inequalities in terms

of the variables you selected in part a. expressing the given restrictions. ***Be sure to include in your system an inequality to guarantee that no more than 45 kilograms of Food II will be purchased and also include inequalities that are necessary to guarantee that no negative values can be used for the variables.***

- (d) What is the objective function for this problem?
- (e) On graph paper, make a neat graph of the feasible region for the system of inequalities found in part (c) and find the coordinates of the corner points of the feasible region.
- (f) What is the value of the objective function at each corner point of the feasible region?

Corner Points	Objective Function:

- (g) In a sentence, state how many kilograms of Food I and how many kilograms of Food II the dietician should purchase in order to meet the nutritional requirements at the lowest cost.
- (h) What is the amount of the lowest cost?
- (i) If the cost of Food I rises to \$4 per kilogram and the cost of Food II drops to \$2 per kilogram, how many of each food should the dietician purchase in order to meet the nutritional requirements at the lowest cost? What is the lowest cost with these new prices?