

**MATH 140: WEEK-IN-REVIEW 4 (3.1, 3.2, & 3.3)**

**Problem 1** *SET UP the following linear programming problem, but DO NOT SOLVE.*

*A baker has 600 pounds of chocolate, 100 pounds of nuts, and 50 pounds of fruit, with which to make three types of candy, A, B, and C. A box of candy A uses 3 pounds of chocolate, 1 pound of nuts, 1 pound of fruit, and it sells for \$8. A box of candy B requires 4 pounds of chocolate,  $1/2$  pound of nuts, and sells for \$5. A box of candy C requires 5 pounds of chocolate,  $3/4$  pound of nuts, 1 pound of fruit, and sells for \$6. How many boxes of each type of candy should be made from the inventory available and sold in order to maximize revenue?*

**Problem 2** *SET UP the following linear programming problem, but DO NOT SOLVE.*

A rental company has two types of trucks; type A has 20 cu.ft. of refrigerated space and 40 cu.ft. of non-refrigerated space, and type B has 30 cu.ft. each of refrigerated and non-refrigerated space. A food plant must ship at least 900 cu.ft. of refrigerated produce and 1200 cu.ft. of non-refrigerated produce. If truck A rents for 30 cents per mile and truck B rents for 40 cents per mile, then how many of each truck should the plant rent in order to minimize rental costs per mile?



**Problem 3** Graph the solution set for each of the following systems of linear inequalities. Determine all corner points, and state whether the solution set is bounded or unbounded.

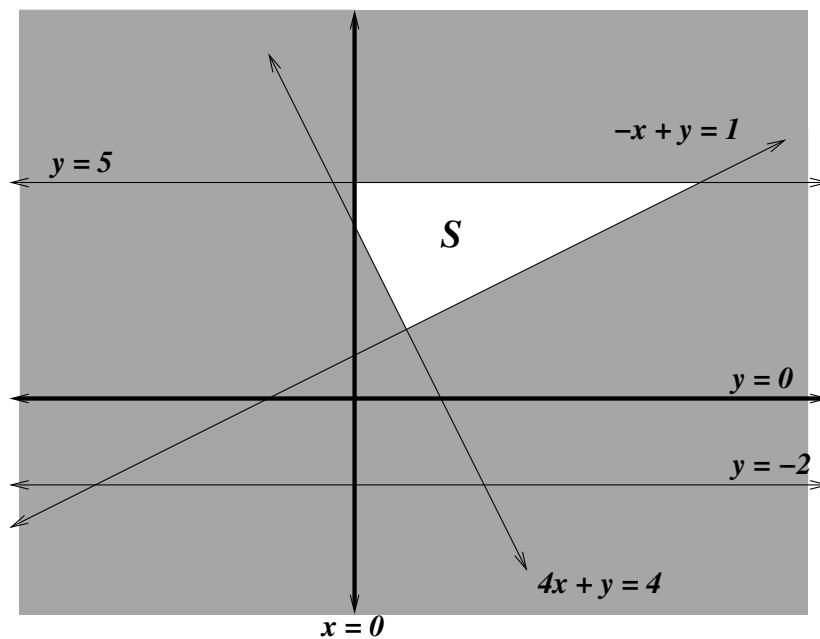
(a)  $x - y \leq 10$   
 $2x + 5y \geq 20$   
 $x > 4$   
 $y \geq 1$



$$(b) \quad \begin{aligned} -0.5x + 4y &\leq 5 \\ 2x + y &\leq 0 \\ -6 &\leq x \leq 4 \\ y &\geq -8 \end{aligned}$$



**Problem 4** Write the system of linear inequalities that would produce the given solution set.  
(NOTE: The solution set,  $S$ , is left unshaded.)





**Problem 5** *Solve the following linear programming problem using the Method of Corners.*

(a) *OBJECTIVE: Maximize*  $R = 15x + 9y$

*SUBJECT TO:*  $x + y \leq 5$

$$-x + 2y \leq 6$$

$$3x - 4y \leq 12$$

$$x \geq 0, y \geq 0$$

(b) *Is there a minimum value of  $R$  subject to these constraints?*



**Problem 6** *Solve the following linear programming problem using the Method of Corners.*

(a) *OBJECTIVE: Minimize*  $C = 10x + 15y$

*SUBJECT TO:*  $2x + 3y \geq 12$

$$x - 3y \leq 2$$

$$x - y \geq -3$$

$$x \geq 2, y \geq 2$$

(b) *Is there a maximum value of  $C$  subject to these constraints?*



**Problem 7** *A company has 100 kg of dry cereal and 125 kg of chocolate candy to be used in making two different snack mixes. One mix will contain half cereal and half candy, and will sell for \$6 per kilogram. The other mix will contain  $\frac{1}{3}$  cereal and  $\frac{2}{3}$  candy, and will sell for \$4.80 per kilogram. How many kilograms of each mix should the company prepare and sell for maximum revenue? What is the maximum revenue?*





**Problem 8** *A seamstress has 80 units of cotton material and 120 units of wool material to make suits and dresses. A suit requires 1 unit of cotton and 3 units of wool; a dress requires 2 units of each material. Due to previous demand, it has been determined that at most 10 suits should be made. If each suit brings in \$20 profit and each dress brings in \$30 of profit, how many of each garment should the seamstress produce and sell in order to maximize profit? Will there be any leftover resources when maximizing profit?*

*The set up for this problem is given below. What do the variables represent? What does each inequality represent? After determining these, solve the problem.*

$$x = \underline{\hspace{15em}}$$

$$y = \underline{\hspace{15em}}$$

$$P = \underline{\hspace{15em}}$$

*OBJECTIVE: Maximize  $P = 20x + 30y$*

*SUBJECT TO:  $x + 2y \leq 80$*

$$3x + 2y \leq 120$$

$$0 \leq x \leq 10$$

$$y \geq 0$$



**Problem 9** *A manufacturer makes two types of shirts. A long sleeve shirt requires 2 units of fabric, 10 buttons, and takes 30 minutes to fabricate. A sleeveless shirt requires 1 unit of fabric, 4 buttons, and takes 6 minutes to fabricate. If 100 units of fabric, 200 buttons, and 8 hours are available to create these shirts, it has been determined that maximum revenue occurs when the manufacturer makes and sells 12 long sleeve shirts and 20 sleeveless shirts. Determine if any resources are leftover when maximum revenue is achieved.*