



SECTION 3.1: SETTING LINEAR PROGRAMMING PROBLEMS

1. Set up, but do not solve.

An investment company has two funds, A and B, that you can pick from for your personal investments. Each unit of fund A costs \$15, yields an annual return of 6%, and has a risk index of 2 per unit. Each unit of fund B costs \$12, yields an annual return of 5%, and has a risk index of 1.5 per unit. You have \$42,000 available for investing and want to earn at least \$2,400 in interest in the coming year. How many units of each fund should you purchase in order to meet your goals and also to minimize the total risk index for your portfolio?

**Variables:**

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

**Objective:** Maximize/ Minimize \_\_\_\_\_

**Subject to:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2. Set up, but do not solve.**

Your umbrella company makes three models: the Sprinkle, the Storm, and the Hurricane. The amounts of cloth (square yards), metal(pounds), and wood(pounds) used in making each model are given in the table.

	Cloth	Metal	Wood
Sprinkle	1	2	1
Storm	2	1	3
Hurricane	2	3	6

The profit for the Storm is \$1, for the Hurricane is \$2 and for the Sprinkle is \$1. Due to certain agreements, the company can make at most 170 Sprinkle umbrellas. If the company has 300 square yards of cloth, 800 pounds of metal, 600 pounds of wood, how many of each type of umbrella should be produced in order to maximize the profit?

**Variables:**

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

**Objective:** Maximize/ Minimize \_\_\_\_\_

**Subject to:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3. Set up, but do not solve.**

A cellphone store sells two types of cellphone, standard and deluxe. The supplier demands that at least 300 phones be sold a month. In order to keep profits up, the number of standard cellphones sold must be at least twice the number of deluxe cellphones. The store spends \$150 a week to market each standard phone and \$100 a week to market each deluxe phone. How many of each type of cellphone must be sold to minimize weekly marketing costs? What is the minimum weekly marketing cost?

**Variables:**

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

**Objective:** Maximize/ Minimize \_\_\_\_\_

**Subject to:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**4. Set up, but do not solve.**

You have \$12,000 to invest, some in Stock A and some in Stock B. You have decided that the money invested in Stock A must be at least twice as much as that in Stock B. However, the money invested in Stock A must not be greater than \$9,000. If Stock A earn 3% annual interest, and Stock B earn 4% annual interest, how much money should you invest in each to maximize your annual interest?

**Variables:**

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

**Objective:** Maximize/ Minimize \_\_\_\_\_

**Subject to:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**5. Set up, but do not solve.**

An independent taffy company makes three flavors of taffy: strawberry, lemon, and orange. Each strawberry taffy requires 3 minutes to cooling and 1 minute to wrap in paper. Each orange taffy requires 5 minutes to cool and 1.5 minutes to wrap in paper. Each lemon taffy requires 4 minutes to cool and 2 minutes to wrap in paper. There are a total of 1.5 hours available for cooling and 0.5 hours available for wrapping. Determine the production of each taffy to maximize profit if the profit on the sale of each orange, lemon, and strawberry taffy is 75 cents, 60 cents, and 50 cents, respectively, and previous sales indicate that they should produce at least three times as many strawberry taffy as lemon taffy. How many of each flavor should the company make to maximize their profits? What is the maximum profit and is any time leftover in cooling or wrapping?

**Variables:**

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

\_\_\_\_\_ := \_\_\_\_\_

**Objective:** Maximize/ Minimize \_\_\_\_\_

**Subject to:** \_\_\_\_\_

\_\_\_\_\_

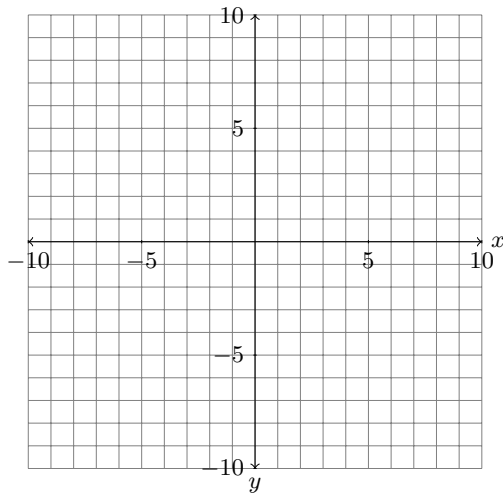
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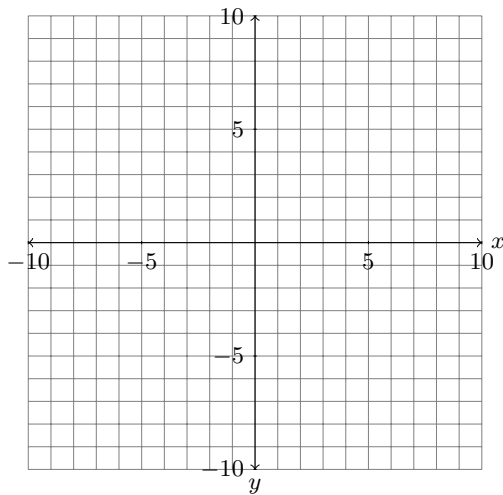
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SECTION 3.2: GRAPHING SYSTEMS OF LINEAR INEQUALITIES IN TWO VARIABLES

1. Graph the inequality  $4x - 7y < 21$ , labeling the boundary line and the solution set with **S**. Graph using true shading.



2. Graph the inequality  $-5x + 9y \geq 0$ , labeling the boundary line and the solution set with **S**. Graph using reverse shading.



3. Graph the system of linear inequalities, the solution set with **S**. Then state whether the solution set is bounded or unbounded and the exact corner point(s) of the solution set. Graph using true shading.

$$x - 2y > 8$$

$$x + y \leq 6$$

$$x < 4$$

$$x - 2y > 8$$

$$x + y \leq 6$$

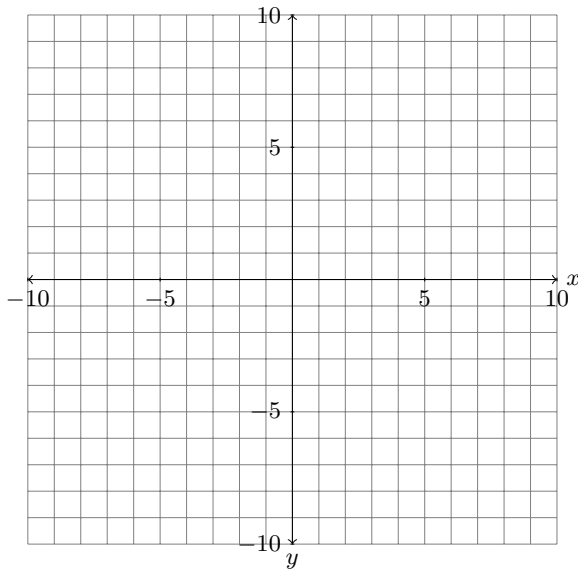
$$x < 4$$

**Boundary Line:**

***x*-intercept:**

***y*-intercept:**

**Test Point:**



**Corner Points:**

4. Graph the system of linear inequalities, the solution set with **S**. Then state whether the solution set is bounded or unbounded and the exact corner point(s) of the solution set. Graph using reverse shading.

$$8x + 5y \leq 40$$

$$3x + 5y \geq 30$$

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

$$8x + 5y \leq 40$$

$$3x + 5y \geq 30$$

$$x \geq 0$$

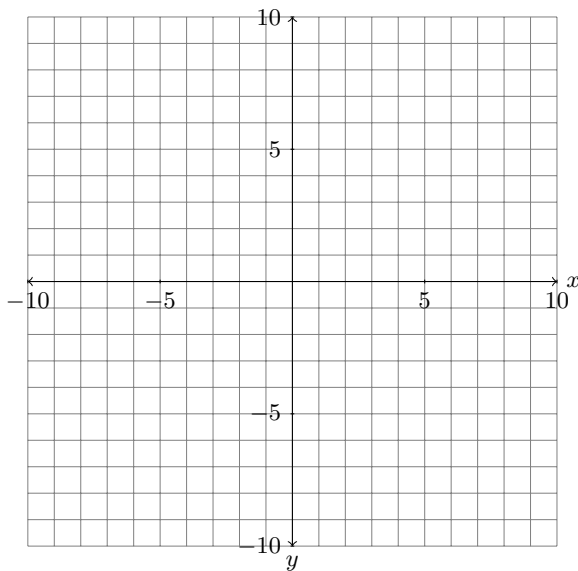
$$y \geq 0$$

**Boundary Line:**

***x*-intercept:**

***y*-intercept:**

**Test Point:**



**Corner Points:**



5. Use the graph below to write the corresponding system of linear inequalities.

