

Name: _____
Date: _____ Period: _____

**Unit 11 – Partial Fractions with Linear Programming – Day 4 – Solving
Non-Linear Systems Homefun**

Solve for the following variables.

1.
$$\begin{aligned} xy &= 3 \\ x^2 + y^2 &= 10 \end{aligned}$$

2.
$$\begin{aligned} x^2 + y^2 &= 25 \\ x - y &= 1 \end{aligned}$$

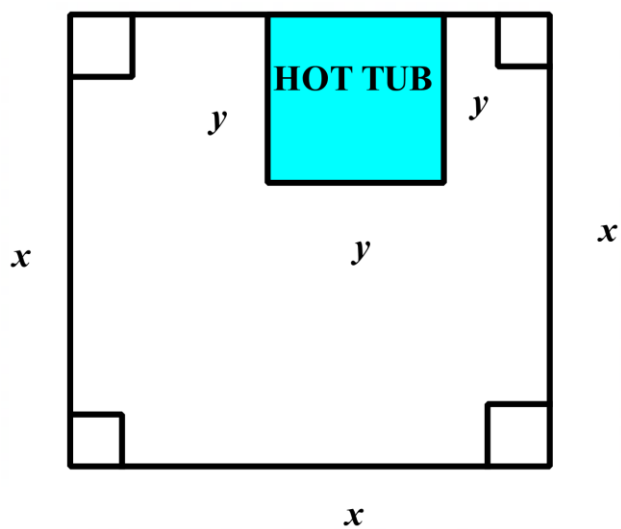
3.
$$\begin{aligned} x + y &= 1 \\ x^2 + xy - y^2 &= -5 \end{aligned}$$

4.
$$\begin{aligned} y^2 - x &= 4 \\ x^2 + y^2 &= 4 \end{aligned}$$

5.
$$\begin{aligned} x^3 + y &= 0 \\ x^2 &= y \end{aligned}$$

6.
$$\begin{aligned} x^2 + (y - 2)^2 &= 4 \\ x^2 - 2y &= 0 \end{aligned}$$

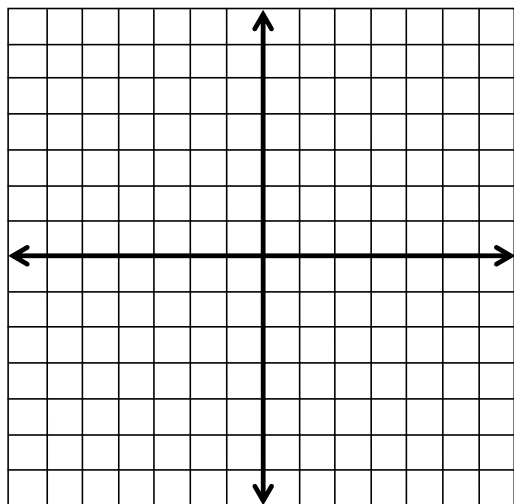
7. The figure shows a square floor plan with a smaller square area that will be cut out for a hot-tub area. The floor with the hot-tub area removed has an area of 21 square meters and a perimeter of 24 meters. What are the dimensions of the hot tub area?



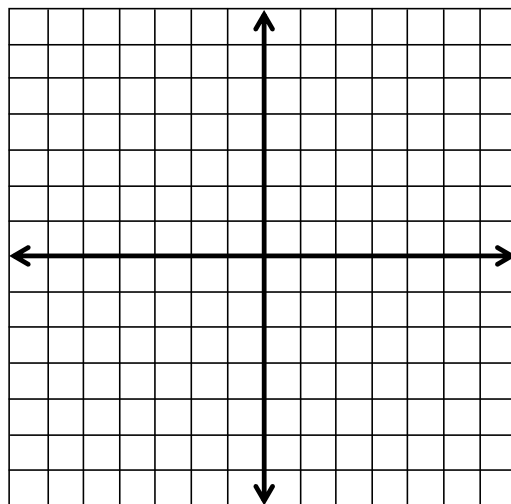
Unit 11 – Partial Fractions with Linear Programming – Day 5 – Solving Inequality Systems

Graph the solution set of each system of inequalities or indicate that the system has no solution.

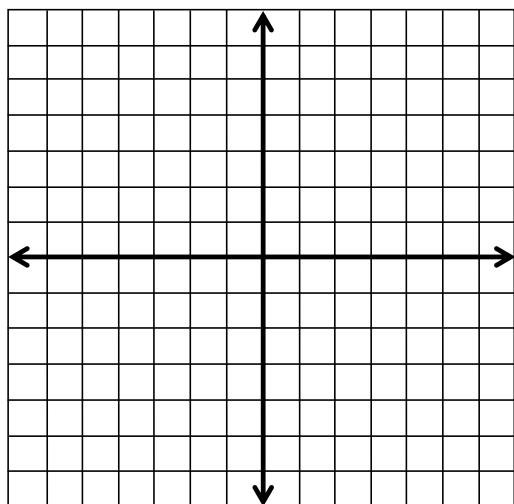
1)
$$\begin{cases} y \geq x^2 - 4 \\ x - y \geq 2 \end{cases}$$



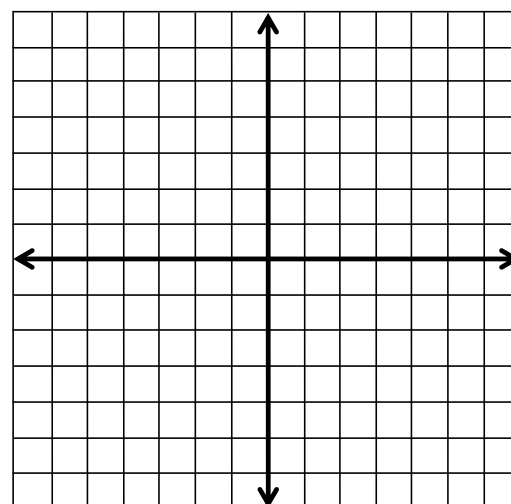
2)
$$\begin{cases} x^2 + y^2 \leq 4 \\ x + y > 1 \end{cases}$$



3)
$$\begin{cases} x^2 + y^2 > 1 \\ x^2 + y^2 < 9 \end{cases}$$

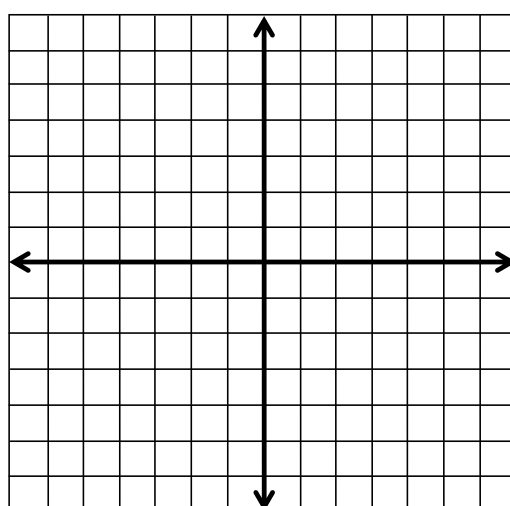
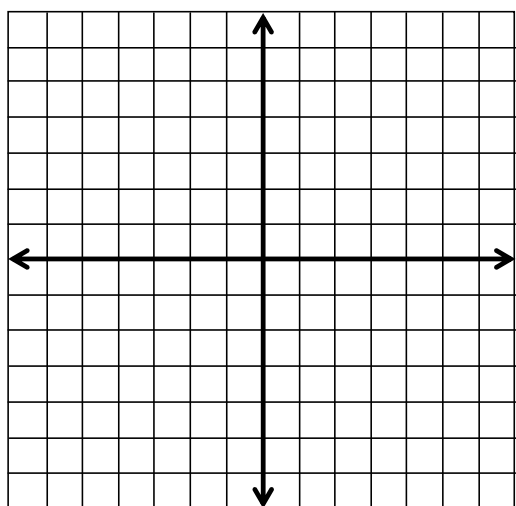


4)
$$\begin{cases} (x + 1)^2 + (y - 1)^2 < 16 \\ (x + 1)^2 + (y - 1)^2 \geq 4 \end{cases}$$



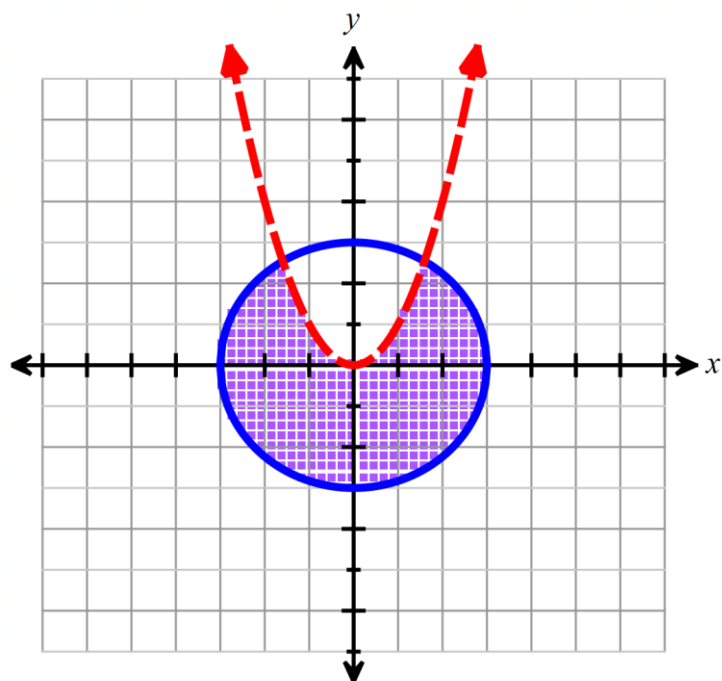
5) $\begin{cases} x^2 + y^2 < 16 \\ y \leq 2^x \end{cases}$

6) $\begin{cases} x \geq 0 \\ y \geq 0 \\ 2x + 5y < 10 \\ 3x + 4y \leq 12 \end{cases}$



Write a system of inequalities for the graph below.

7)

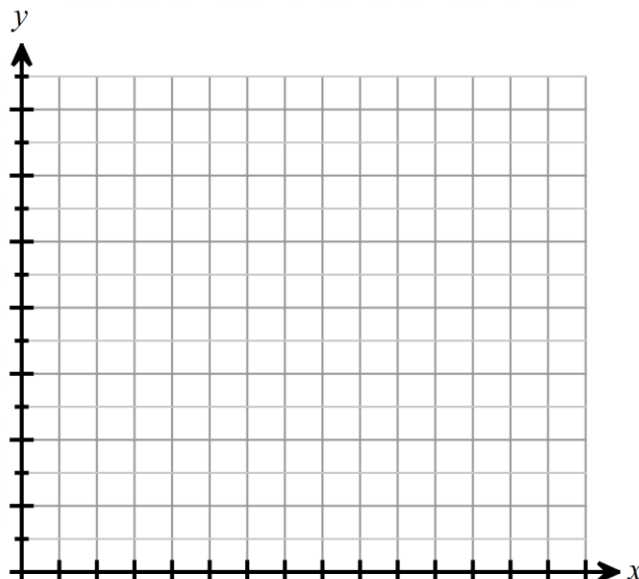


Unit 11 – Partial Fractions with Linear Programming – Day 6 – Introduction to Linear Programming

In Exercises 1-3, graph the region determined by the constraints. Then find the maximum value of the given objective function, subject to the constraints.

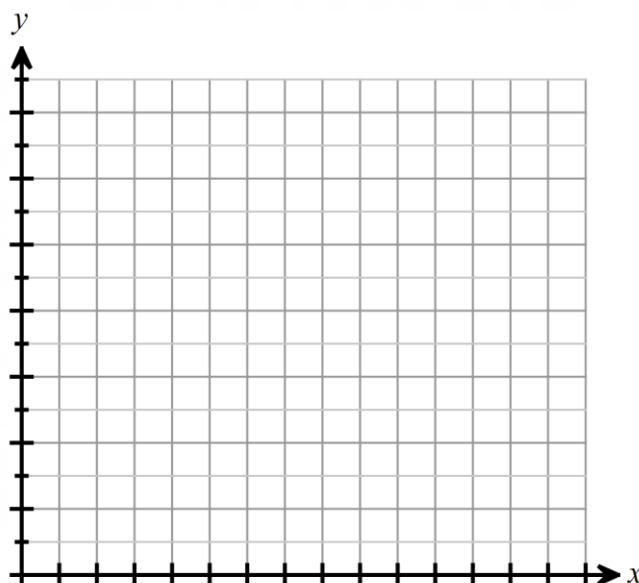
1)

Objective Function	$z = 2x + 3y$
Constraints	$x \geq 0, y \geq 0$ $x + y \leq 8$ $3x + 2y \geq 6$



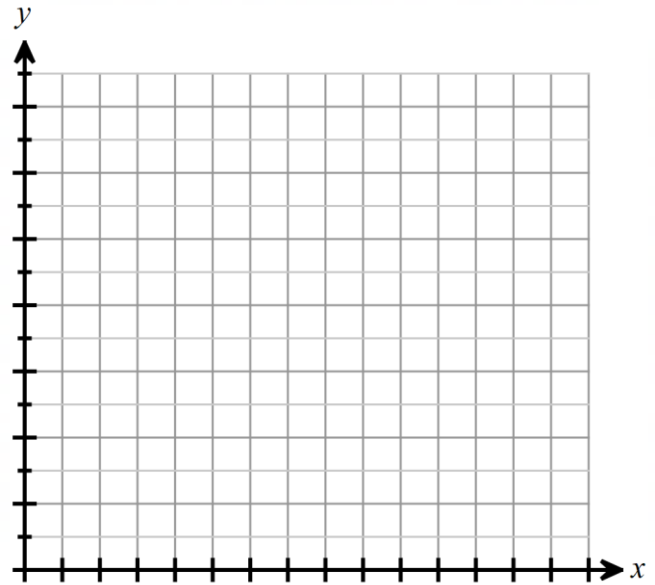
2)

Objective Function	$z = x + 4y$
Constraints	$0 \leq x \leq 5$ $0 \leq y \leq 7$ $x + y \geq 3$



3)

Objective Function	$z = 5x + 6y$
Constraints	$x \geq 0$ $y \geq 0$ $y \leq x$ $2x + y \leq 12$ $2x + 3y \geq 6$



4) A paper manufacturing company converts wood pulp to writing paper and newsprint. The profit on a unit of writing paper is \$500 and the profit on a unit of newsprint is \$350.

- a) Let x represent the number of units of writing paper produced daily. Let y represent the number of units of newsprint produced daily. Write the objective function that models total daily profit.

$Z =$ _____

- b) The manufacturer is bound by the following constraints:

- Equipment in the factory allows for making at most 200 units of paper (writing and Newsprint) in a day.
- Regular customers require at least 10 units of writing paper and at least 80 units of newsprint daily.

Write a system of inequalities that models these constraints.

- b. Graph the inequalities in part b. Use only the first quadrant, because x and y must both be positive. (Possible scale of 20?)

- c. Evaluate the objective function at each of the three vertices of the graphed region above.

- d. Complete the missing portions of the this statement:

The company will make the greatest profit by producing _____ units of writing paper and _____ units of newsprint each day. The maximum profit is \$_____.

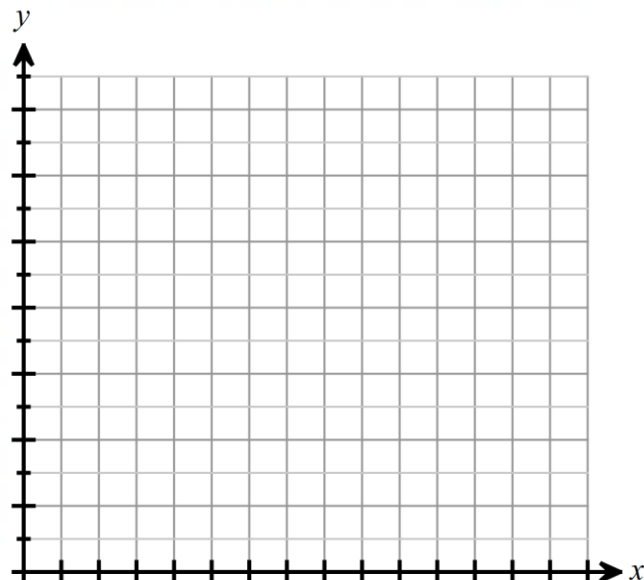
Unit 11 – Partial Fractions with Linear Programming – Day 7 – Linear Programming

Graph each set of constraints and then maximize each objective function.

1. Objective Function & Constraints

$$z = 4x + y$$

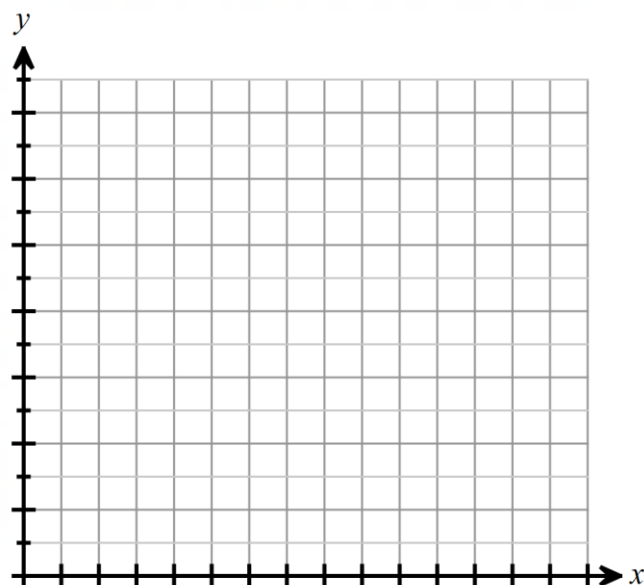
$$\begin{cases} x \geq 0, y \geq 0 \\ 2x + 3y \leq 12 \\ x + y \geq 3 \end{cases}$$



2. Objective Function & Constraints

$$z = x + 6y$$

$$\begin{cases} x \geq 0, y \geq 0 \\ 2x + y \leq 10 \\ x - 2y \geq -10 \end{cases}$$



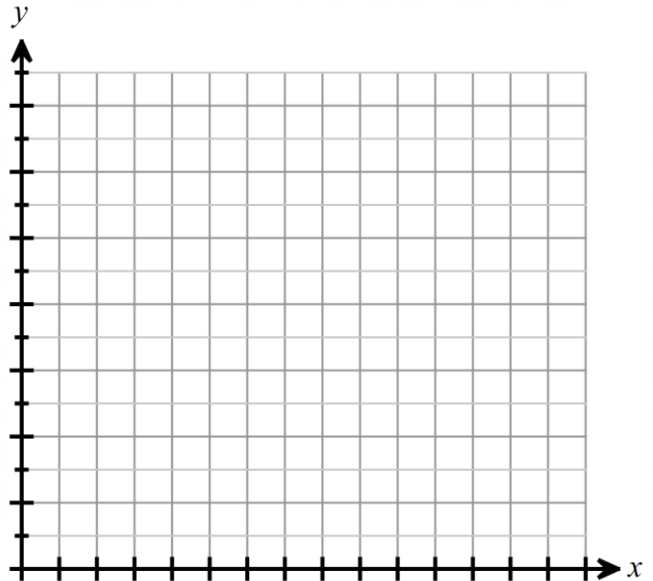
3. In 1978, a ruling by the Civil Aeronautics Board allowed Federal Express to purchase larger aircraft. Federal Express's options include 20 Boeing 727's that United Airlines was retiring and/or the French- built Dassault Fanjet Falcon 20. To aid in their decision. Executives at Federal express analyzed the following data:

	Boeing 727	Falcon 20
Direct Operating Cost	\$1400 per hour	\$500 per hour
Payload	42,000 pounds	6000 pounds

Federal Express was faced with the following constraints:

- Hourly operating costs was limited to \$35,000.
- Total payload had to be at least 672,000 pounds.
- Only twenty 727s were available

Given the constraints, how many of each kind of aircraft should Federal Express have purchased to maximize the number of aircraft?



4. Suppose you inherit \$10,000. The will states how you must invest the money. Some (or all) of the money must be invested in stocks and bonds. The requirements are that at least \$3000 be invested in bonds with expected returns of \$0.08 per dollar and at least \$2000 be invested in stocks with expected returns of \$0.12 per dollar. Because the stocks are medium risk, the final stipulation requires that the investment in bonds should never be less than the investment in stocks. How should the money be invested so as to maximize your expected returns?

