Section 3.1 – Solving Systems of Equations Graphically

Goals:

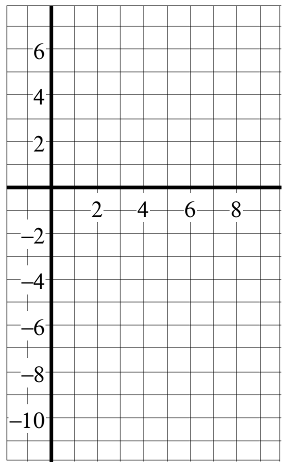
1. To Solve systems of equations graphically (manually and on a graphing calculator)

Classification of Systems of Equations

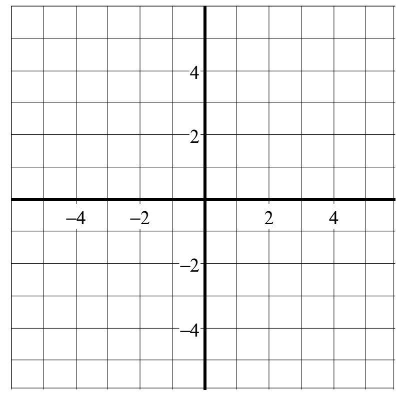
1. Consistent –
   - Dependent –
   - Independent –
2. Inconsistent –

Examples:

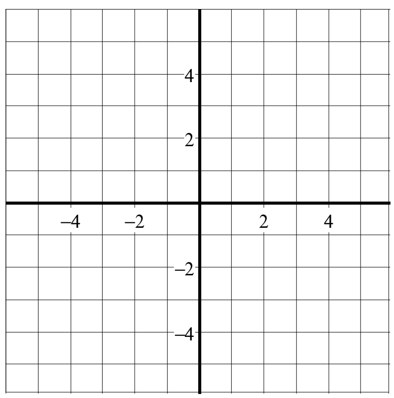
- Manually:
  - $x + y = 5$
    $3x - 2y = 20$



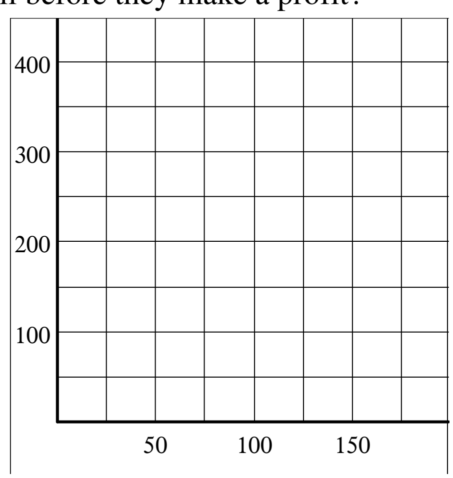
  - $y = -3x + 5$
    $9x + 3y = 15$



  - $\frac{1}{2}x + \frac{1}{3}y = 1$
    $2x - 3y = 6$



  - Fund-raising A service club is selling copies of their holiday cookbook to raise funds for a project. The printer's set-up charge is $200, and each book costs $2 to print. The cookbooks will sell for $6 each. How many cookbooks must the members sell before they make a profit?



- Graphing Calculator:
  - $x - y = 5$
    $x + 2y = -4$
  - $y = 3.25x + 4.3$
    $y = -2.2x - 1.78$

Homework: Day 1: p. 138 – 3-12 all, 17-31 odds
Day 2: Calculator Only p. 142 – 1-10 all and p. 140 – 41

Section 3.2 – Solving Systems of Equations Algebraically

Goals:

1. To Solve systems of equations algebraically using the substitution or elimination method.

I. Substitution Method

A. Method

1. Look for the ________________ that does not have a ___________ ________________.
2. _____________ the ______________ for that variable.
3. _____________ that _____________ into the ______________ equation for that ___________
4. _____________ the ______________.
5. _____________ that _____________ in a solve for ___________ variable

B. Examples

1. $x + 4y = 26$
   $x - 5y = -10$

2. $x - 3y = 2$
   $x + 7y = 12$

II. Elimination Method

A. Goal – by adding the two equations together you can eliminate one of the variables.

B. Examples

1. $x + 2y = 11$
   $x + y = 6$

2. $2x + 3y = 12$
   $5x - 2y = 11$

III. Miscellaneous Items

A. Which Method?

It is not a matter of which method is easier or better, both methods need to be utilized.

Example (Which method would you use and why?)

1. $x + 3y = 7$
   $2x + 5y = 10$

2. $2x + 3y = 11$
   $-4x - 6y = 20$

B. Extraneous situations

1. No solution –
2. Infinite solutions –

Homework: Day 1: p. 146 – 1-7 all, 15-27 odds, 74 – 80 all
Day 2: p. 146 – 8-13 all, 29-39 odds, 43, 55, 64

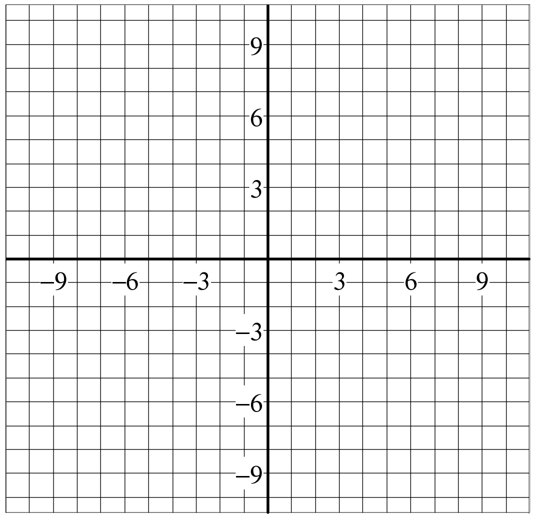
Section 3.3 –Systems of Linear Inequalities

Goals:
1. To solve systems of linear inequalities.

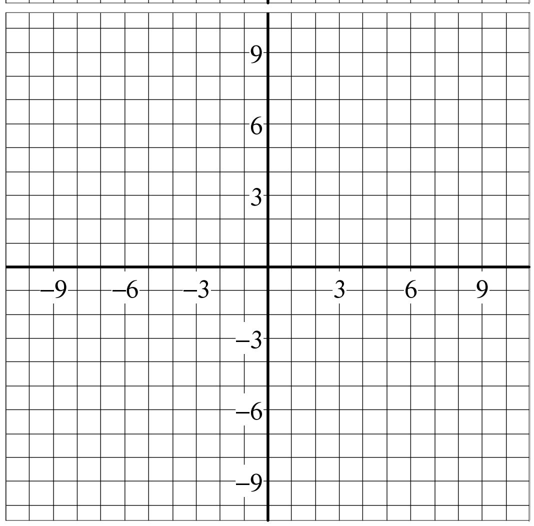
Method – Solving systems of inequalities can only be solved by graphing.

Examples

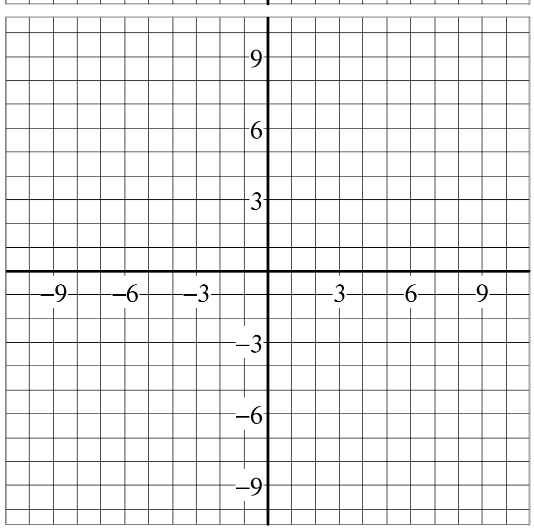
1. $y \geq 2x - 3$
   $y < -x + 2$



2. $y \leq -x + 1$
   $|x + 1| < 3$



3. $2x - y \geq -1$
   $x + y \leq 4$
   $x + 4y \geq 4$



Homework: Day 1: p. 154 – 1-6 all, 7-21 odds, 56-61 all
Day 2: p. 159 – 1-22 all

Section 3.4 – Linear Programming

Goals:

1. To find the maximum and minimum values of a function over a region using linear programming techniques.

Linear Programming Technique

Item #1	Item #2	Combined

1. Ask your self, what _____ things do I need to know to answer the question?
2. Make a _________ of items given.
3. Write your maximum or minimum function –
4. Write your _________________
5. Graph the _______________ – should be left with a ________________ ___________.
6. Find the _____________ of the region –
7. Plug in vertices into _____________________ to find the maximum and minimum value

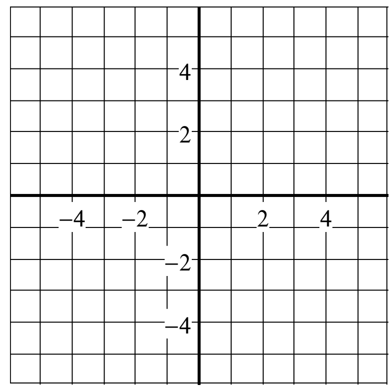
Examples

1. Graph the following constraints. Then find the maximum and minimum values of the function $f(x, y) = 3x - 2y$.

   $x \le 5$

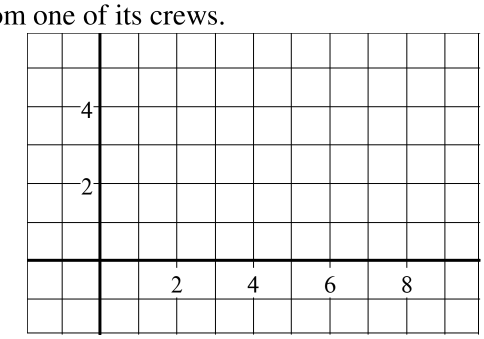
   $y \le 4$

   $x + y \ge 2$



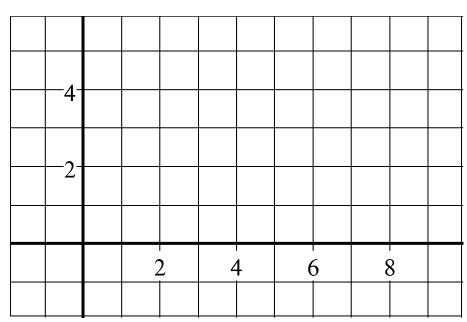
2. A landscaping company has crews who mow lawns and prune shrubbery. The company schedules 1 hour for mowing jobs and 3 hours for pruning jobs. Each crew is scheduled for no more than 2 pruning jobs per day. Each crew's schedule is set up for a maximum of 9 hours per day. On the average, the charge for mowing a lawn is $40 and the charge for pruning shrubbery is $120. Find a combination of mowing lawns and pruning shrubs that will maximize the income the company receives per day from one of its crews.

   <u>Profit Function:</u>
   <u>Constraints:</u>
   a.
   b.
   c.
   d.



3. A landscaping company has crews who rake leaves and mulch. The company schedules 2 hours for mulching jobs and 4 hours for raking jobs. Each crew is scheduled for no more than 2 raking jobs per day. Each crew's schedule is set up for a maximum of 8 hours per day. On the average, the charge for raking a lawn is $50 and the charge for mulching is $30. Find a combination of raking leaves and mulching that will maximize the income the company receives per day from one of its crews.

   <u>Profit Function:</u>
   <u>Constraints:</u>
   a.
   b.
   c.
   d.



Homework: Day 1: p. 163 – 1-6 all, 9, 15 Day 2: Worksheet

Section 3.5 – Solving Systems Equations in Three Variables

Goals:

1. To solve a system of equations with three variables.

A. Method:
   1. Add _________ and __________ equations to ___________ one variable. – the result is where the two ___________ intersect (a __________)
   2. Add _________ and __________ equations to ___________ the one variable you eliminated in the previous steps.
   3. Take the two __________ equations (_______) you found and solve for one of the variables, by adding the two equations together.
   4. Now that you found one variable, back ___________ to find the ordered _________.

B. Note: systems of three equations can have a __________ solution (________), ____________ of solutions (________), or _______ solution. – see pictures on page 138

C. Examples

   1. $$\begin{aligned} 5x+3y+2z&=2 \\ 2x+y-z&=5 \\ x+4y+2z&=16 \end{aligned}$$

   2. There are 49,000 seats in a sports stadium. Tickets for the seats in the upper level sell for $25, the ones in the middle level cost $30, and the ones in the bottom level are $35 each. The number of seats in the middle and bottom levels together equals the number of seats in the upper level. When all of the seats are sold for an event, the total revenue is $1,419,500. How many seats are there in each level?

Homework: p. 171 – 1- 7 all, 9, 23