

## LINEAR PROGRAMMING 11/10

Objective: I can extend my knowledge of solving systems of inequalities by solving linear programming problems

HW: Pg 907, #70, 76, 77



## LINEAR PROGRAMMING

A movie theater contains 500 seats. For an upcoming showing of It, the theater sells \$11 and \$15 tickets. They must sell at least 200 \$11 tickets and 100 \$15 tickets for the movie to be shown, and the theater must make at least \$2000 to break even. How many tickets at each price should be sold to maximize income? What is the maximum income?

**Do not solve this.**

**What do you notice and wonder about the problem?**



## LINEAR PROGRAMMING

### **Explore the steps to solving this problem**

A machine can produce Iphone 7 or Iphone X, but not at the same time. The machine can be used for at most 8 hours a day. Also, at most 6 hours a day can be used for making Iphone 7s and at most 5 hours a day can be used for making Iphone Xs. There is a \$50 profit for each hour the machine makes Iphone 7s and a \$75 profit for each hour the machine makes Iphone Xs. How many hours per day should the machine make each item in order to maximize profit? What is the maximum profit per day?

Think about: What might the definition of linear programming be based on this problem?



## LINEAR PROGRAMMING

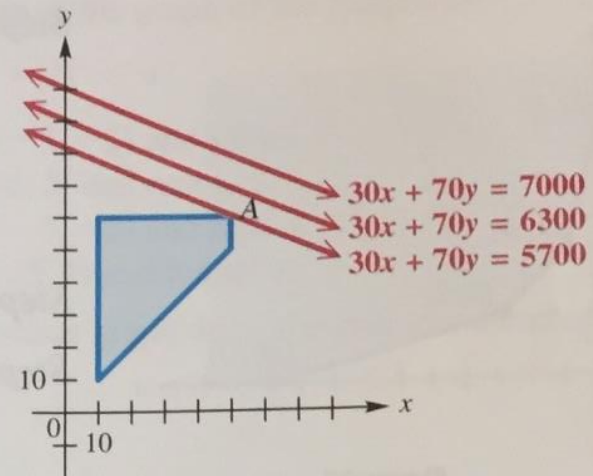
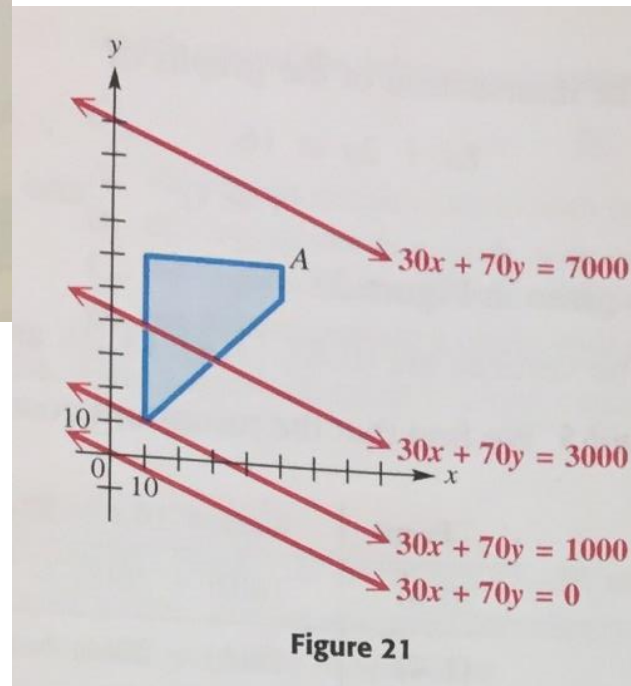
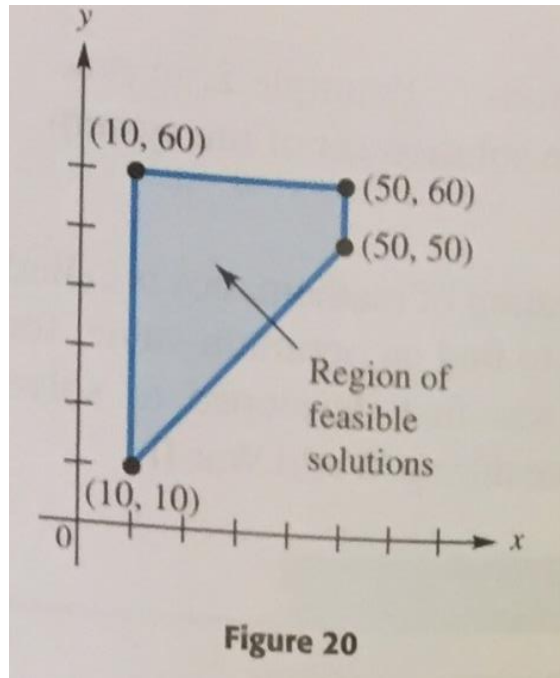
A machine can produce Iphone 7 or Iphone X, but not at the same time. The machine can be used for at most 8 hours a day. Also, at most 6 hours a day can be used for making Iphone 7s and at most 5 hours a day can be used for making Iphone Xs. There is a \$50 profit for each hour the machine makes Iphone 7s and a \$75 profit for each hour the machine makes Iphone Xs. How many hours per day should the machine make each item in order to maximize profit? What is the maximum profit per day?

What steps did you do to solve this?



# LINEAR PROGRAMMING

To explain the vertices: Example 3 from the textbook



# LINEAR PROGRAMMING

## ○ Write these steps down in your notes!

1. Write the constraints and the *objective function*  
Ex.  $x \leq 10$ ,  $y \geq 2$ ,  $x + y < 50$  and Profit =  $2x + 6y$
2. Graph all constraints to find the *region of feasible solutions* (the overly shaded region)
3. Identify all vertices
4. Find the value of the objective function at each vertex
5. Determine optimal value



## LINEAR PROGRAMMING

- Now that you know how to solve, graph the *objective function with the optimal value* from the exploration problem on your graph paper
  - Ex:  $2x + 6y \geq 17$



## LINEAR PROGRAMMING

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## LINEAR PROGRAMMING

Shawn has to buy some Chick Fil A for his friends' get together. He needs at least 30 chicken nuggets and at least 10 milkshakes. He can choose between the nuggets which cost \$0.38 per nugget and small milkshakes for \$2.75 each. Shawn has a total of \$75 to spend. How many of each should he buy to minimize his cost yet get enough food for his friends?



## LINEAR PROGRAMMING

What do you think the definition of linear programming is based on the problems you've just solved? Prepare to share your answer!



## LINEAR PROGRAMMING

Linear programming is an application of math used to find an optimum value (such as minimum cost or maximum profit). It was first developed to solve problems in allocating supplies for the US Air Force during World War II.



## LINEAR PROGRAMMING

Describe a real life situation where linear programming can be used

**You do not have to make up the equations or anything!**

RAFT:

R- role the writer is presenting

A-audience: the world, twitter, etc

F-format: tweet (140 character)

T-Topic: relating a real life situation to linear programming



# LINEAR PROGRAMMING

Padlet:

<https://padlet.com/ectcollege/5dvpqrtu2c0i>

Or



Also post how much you understand linear programming

1-I don't understand at all

5- I totally get it!

Create and post a 140 character tweet describing a situation where linear programming could be used. **Be prepared to share**



## LINEAR PROGRAMMING

Robin takes vitamin pills each day. She wants at least 16 units of Vitamin A and at least 5 units of Vitamin B. She can choose between red pills, costing \$.10 each that contain Vitamin A or she can choose the blue pills costing \$.20 each, containing B. Robin has room in her container for 50 pills. How many of each pill should she buy to minimize her cost and yet fulfill her daily requirements?

X=number of red pills she should buy

Y=number of blue pills she should buy

[Kahoot.it](https://kahoot.it)



# LINEAR PROGRAMMING

