Fall 2021 Pre-calculus
Lesson 12.4

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Lehman High School
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students need calculators
no new vocab

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do now

be sure to: Get out your **binder**. Copy **goal** and answer **do now** questions below. Show all work or write a complete sentence for each answer:

1. Carefully read the paragraph to the right, bulleting key info in your notes.
2. How could you represent the key info as a **table**?
3. What do you think you will optimize for in this problem?

Dr. Galvez and Dr. Guillermo finally got FDA approval, are ready to take their experimental medicine Precalodine into commercial production. Each dose of the drug uses three separate ingredients: A, B, C. There are two versions of the drug, which differ in how much of each ingredient is used.

Version #1 uses 50 mg of ingredient A, 25 mg of ingredient B, and 30 mg of ingredient C. Version #2 uses 100 mg of ingredient A, 75 mg of B, and only 5 mg of C. Version #1 sells for $5 and version #2 for $7.50. The factory has 1000 mg of A, 600 mg of B, and 400 mg of C

see handwritten notes for solution

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framing

- **what:** use graphical method to find the optimal solution for a problem with at least 3 constraints?
- **why:** this is an extension of what we were doing earlier in the week with two constraints
- **where to:** linear optimization with more than two variables

the plan: We'll go through one of the Pset #5 word problems together.
You'll work with a partner to solve some other word problems

Independent work — Dr. O'Brien, 4/28/22

be sure to: For each question:.
1. Write down the constraints as inequalities.
2. Use Desmos graphing calculator to find the **feasible region**. Describe the feasible region in a sentence.
3. Use verticies of feasible region to solve the problem.

1. Dr. Galvez and Dr. Guillermo finally got FDA approval, are ready to take their experimental medicine Precalodine into commercial production. Each dose of the drug uses three separate ingredients: A, B, C. There are two versions of the drug, which differ in how much of each ingredient is used. Version #1 uses 50 mg of ingredient A, 25 mg of ingredient B, and 30 mg of ingredient C. Version #2 uses 100 mg of ingredient A, 75 mg of B, and only 5 mg of C. Version #1 sells for $5 and version #2 for $7.50. The factory has 1000 mg of A, 600 mg of B, and 400 mg of C. Find how much of each version should be made to maximize revenue.
2. Assume the recipes are identical for both versions of precalodine, and that the factory has the same amount of ingredients A and B. But now they must use **at least** 200 mg of ingredient C. What's the smallest amount of each version that can be made to satisfy these constraints?

Feasible region
The part of a graph that satisfies all the constraints for an optimization problem

Graphical method
The optimal solution for a problem is always one of the vertices of the feasible region

class: pre-calculus **goal:** HDW use graphs to find the optimal solution for a problem with 3+ constraints?

preplanned questions:
+What are you trying to optimize for this problem? The revenue, based number of bookshelves and tables to be made?
+How do you figure out the inequalities? Focus on lumber and labor, how much is used for each product, and what the maximum amount is.
+What do the variables x and y represent? tables and bookshelves?
+How can the desmos graphing calculator be useful? plot the feasible region and find the vertices. Those represent possible solutions.

Dr. O'Brien, 4/28/22

Reflection

1. **How is the graphical method different from the algorithm we learned before break? How is it similar?**
2. **Why is the graphical method useful?**
3. **What lingering questions do you have about the graphical method?**

class: pre-calculus **goal:** HDW use graphs to find the optimal solution for a problem with 3+ constraints?
