MA162: Finite mathematics

Jack Schmidt

University of Kentucky

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Schedule:

- Exam 2 is Today, Oct 17th, 2011, in CB106.

Today we will review chapter 3: Linear programming with two decisions

Exam 2: Overview

- 50% Ch. 3, Linear optimization with 2 variables
  1. Graphing linear inequalities
  2. Setting up linear programming problems
  3. Method of corners to find optimum values of linear objectives
- 50% Ch. 4, Linear optimization with millions of variables
  1. Slack variables give us flexibility in RREF
  2. Some RREFs are better (business decisions) than others
  3. Simplex algorithm to find the best one using row ops
  4. Accountants and entrepreneurs are two sides of the same coin

Linear programming problems

- An LPP has three parts:
  - The variables (the business decision to be made)
  - The inequalities (the laws, constraints, rules, and regulations)
  - The objective (maximize profit, minimize cost)
- When there are two variables, we graph the inequalities
- The minimum and maximum occur at corners
- Just try them all

Practice exam #7: Graph it

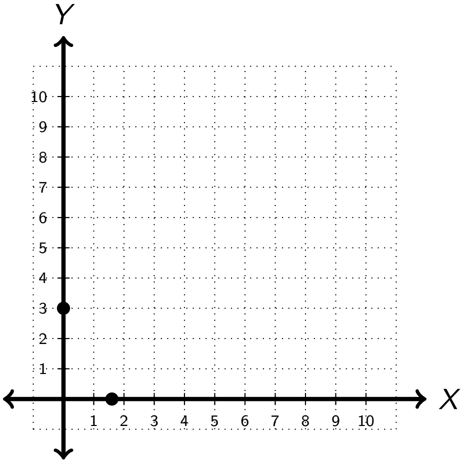
- Graph the feasible region for the following LPP. You will be graded on three aspects: correctly drawn edges, correctly shaded region, and correctly labelled corners.

  Maximize $P = 8x + 2y$ subject to

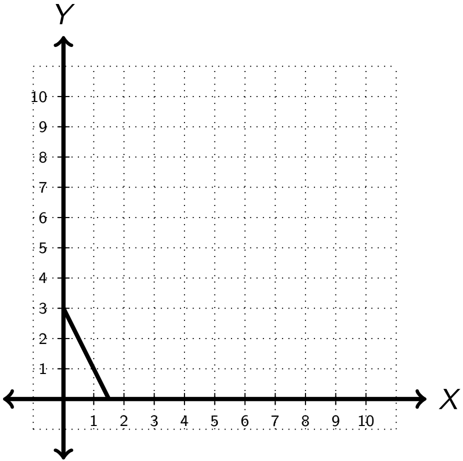
$$\begin{cases} A: & 2x + y \geq 3 \\ B: & 4x - 4y \leq 0 \\ C: & 5x + 5y \leq 50 \\ D: & -11x + 10y \leq 30 \end{cases}$$

  and $x \geq 0$, $y \geq 0$.

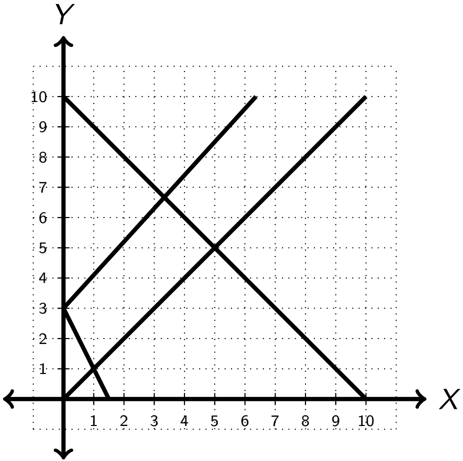
Practice exam #7: The graph



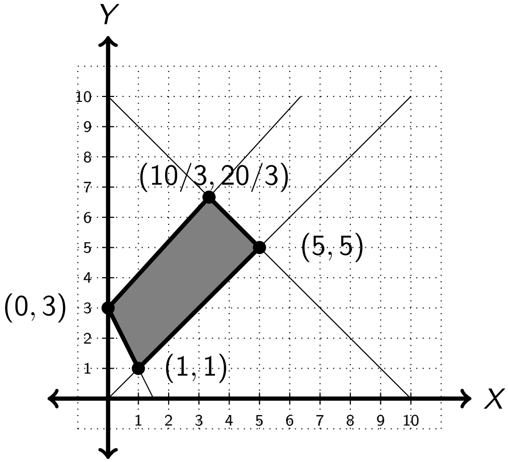
Practice exam #7: The graph



Practice exam #7: The graph



Practice exam #7: The graph



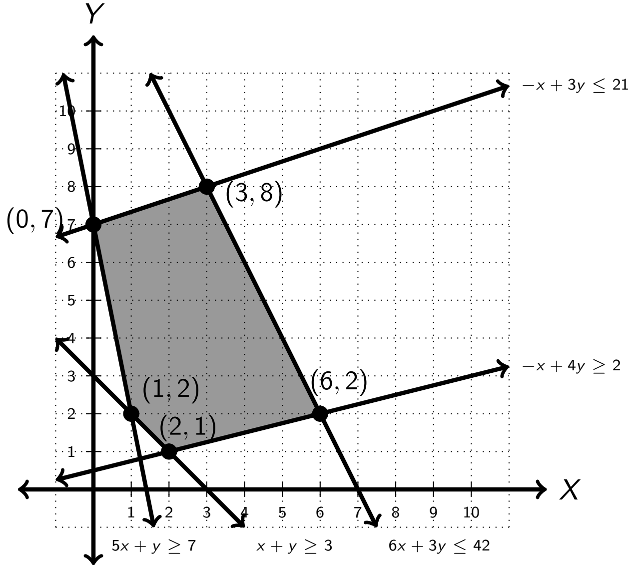
Practice exam #8: Check the corners

- List the corners, determine if the region is bounded or unbounded, and find the maximum value of P.
  Maximize $P = 8x + 2y$ subject to

$$\begin{cases} 5x + \ \ y \geq \ 7 \\ \ \ x + \ \ y \geq \ 3 \\ -x + 4y \geq \ 2 \\ 6x + 3y \leq 42 \\ -x + 3y \leq 21 \end{cases}$$

  and $x \geq 0$, $y \geq 0$.

Practice exam #8: The graph



Practice exam #8: Check the corners

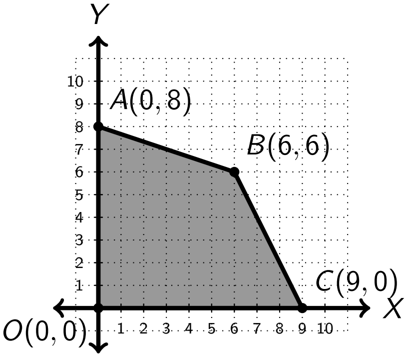
Just plug the corners into the objective function $P = 8x + 2y$

X	Y	P
0	7	$8(0) + 2(7) = 14$
1	2	$8(1) + 2(2) = 12$
2	1	$8(2) + 2(1) = 18$
6	2	$8(6) + 2(2) = 52$
3	8	$8(3) + 2(8) = 40$

- Max is 52 at $(x = 6, y = 2)$

Practice exam #9: Graph to inequalities

- Determine a system of inequalities that defines the feasible region graphed below:



Practice exam #9: Graph to inequalities

- Given two points, find the line:

- Line AB has slope $\frac{8-6}{0-6} = \frac{-1}{3}$ and equation $y - 8 = \frac{-1}{3}(x - 0)$

- This can be rewritten as $y + \frac{1}{3}x = 8$
  $x + 3y = 24$

- Now we need to figure out which inequalitiy, $\leq$ or $\geq$

- Just test a point: $(3, 4)$ is in the region and $3 + 3(4) = 15 \leq 24$ so our answer is:

$$AB : x + 3y \leq 24$$

Practice exam #9: Graph to inequalities

$$AB : x + 3y \leq 24$$

- We do the same for BC to get

$$BC : 2x + y \leq 18$$

- You can do the same for OC, but this is just "the y is positive"

$$OC : y \geq 0$$

- For OA you get an undefined slope, but it is just "the x is positive"

$$OA : x \geq 0$$