4.1 Linear Inequalities in Two Variables

Ex 1 Graph $x - \frac{y}{3} < \frac{-2}{3}$.

Vocab

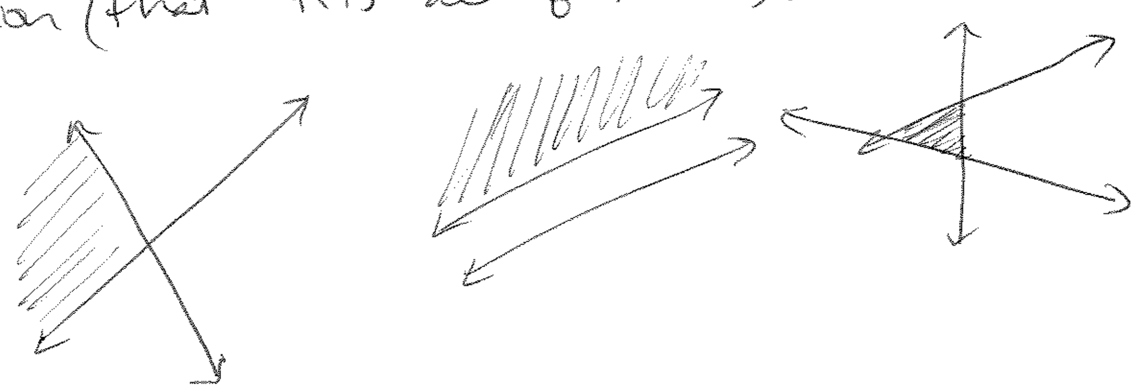
test pt ⇒

half-plane ⇒

System of Inequalities

Two or more inequalities for which we want solution (that fits all of them).

ex



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4.1 (cont)

Ex 2 Graph solution set & label corners.

$$\begin{cases} 4x + 3y \le 240 \\ 5x - y \le 110 \\ x \ge 0 \\ y \ge 0 \end{cases}$$

4.1 (cont)

Ex 3 Graph solution set

$$3x + y \le 9$$
$$3x + 2y \le 12$$
$$x + 2y \le 8$$
$$x \ge 0$$
$$y \ge 0$$

4.1 (cont)

Ex 4 A firm manufactures two types of water bottles. One machine can produce 130 type 1 water bottle, and another machine can produce 120 type 2 water bottle (both per hour). The packaging department can only handle 230 total water bottles per hour. Write the inequalities that describe this situation + graph solution set.

4.2 Linear Programming: Graphical Method

<u>Ex 1</u> Find min + max values of objective function $f = 4x + 3y$ on feasible region

$$\begin{cases} 2x + 3y \leq 12 \\ 4x - 2y \leq 8 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

☆ see blue box, pg 295

feasible region ⇒

closed + bounded ⇒

optimal solution ⇒

☆ optimal solns occur at "corners"

☆ if no corners, may be no optimum values

4.2 (cont)

Ex 2 Minimize $g = 22x + 17y$ subject to constraints

$$\begin{cases} 8x + 5y \geq 100 \\ 12x + 25y \geq 360 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

4.2 (cont)

Ex 3 A contractor builds two types of homes. The Carolina requires one lot, \$160,000 capital, and 160 worker-days of labor, whereas the Savannah requires one lot, \$240,000 capital, and 160 worker-days of labor. The contractor owns 300 lots and has \$48,000,000 available capital and 43,200 worker-days of labor. The profit on the Carolina is \$40,000 & the profit on the Savannah is \$50,000. How many of each type of home should be built to maximize profit? What is the max profit?