7.5 Systems of Inequalities

Any curve cuts a plane in half. An inequality in 2 variables then means we want to shade in all the points that are solns of the inequality.

Ex1 Graph solutions of

$$y \leq x^2 + 3$$

System of Inequalities

Two or more inequalities that are solved simultaneously.

For the solutions of a system of inequalities, we need to

1. graph all eqns on one coordinate axes.
2. shade in the region that meets all conditions (inequalities)

7.5 (cont)

Ex 2 Solve (and label vertices of shaded region).

(a) $x - 7y > -36$

$5x + 2y > 5$

$6x - 5y > 6$

(b) $x < 2y - y^2$

$0 < x + y$

7.5 (cont)

Ex 3 For a concert event, there are $30 reserved seat tickets and $20 general admission tickets. There are 2000 reserved seats available, and fire regulations limit the # of paid ticket holders to 3000. The promoter must take in $75,000 in ticket sales. Find and graph a system of inequalities describing the different #s of tickets that can be sold.

HW: #1-13 odd, 27-47 odd, 61, 63, 71

7.6 Linear Programming

We want to optimize (aka either minimize or maximize) a function given a set of constraints (inequalities) that must be satisfied (which makes the feasible region).

Ex 1 Find max value of $f(x,y) = z = 6x + 5y$ subject to constraints

$$3x + 2y \leq 16$$
$$x + 4y \leq 22$$
$$x \geq 0,\ y \geq 0$$

Linear Programming Strategy

1. Sketch graph of inequalities and shade feasible region.
2. Find all vertices of feasible region.
3. Test all vertices in objective function to find min. or max.

max/min always occur at vertices! (if it exists)

Ex 2 Find max value, and where it occurs, of $f(x,y) = z = 2x+5y$ subject to constraints

$x \geq 0,\ y \geq 0$

$x+2y \geq 8$

$3x+y \geq 14$

$-x+y \leq 10$

7.6 (cont)

Ex 3 A fruit grower has 150 acres of land available to raise two crops, A and B. It takes 1 day to trim an acre of crop A and two days to trim an acre of crop B, and there are 240 days per year available for trimming. It takes 0.3 day to pick an acre of crop A and 0.1 day to pick an acre of crop B. There are 30 days available for picking. The profit is $140 per acre for crop A and $235 per acre for crop B. What is the optimal acreage for each fruit? What is optimal (max) profit?

HW: #1-19 odd, 25-41 odd

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