Modeling and problem solving with stochastic programming

Lesson 1

The first case of mathematical programming is **Linear Programming** (LP). In LP all the variables are positive real number and all LP problem are P while in general Mixed Integere Linear Programming (MILP) are NP-Hard.

Production Problem

x_A, x_W = liters of paint A/W produced

Max $20 * x_A + 30 * x_W$

s.t.

$$x_A \leq 60$$

$$x_W \leq 50$$

$$1 * x_A + 2 * x <_W \leq 120$$

$$x_A, x_W \geq 0$$

Knapsack problem

$x_1, x_2, x_2, x_3, x_4, x_5 = 1$ if the relic is taken 0 else

Max $100x_1 + 300x_2 + 60X_3 + 600x_4 + 450x_5$

s.t.

$$13x_1 + 6x_2 + 9x_3 + 24x_4 + 6x_5 \leq 30$$