LECTURE NOTES
Linear Problems and Graphical Solutions

Learning Objectives

1. Differentiate a general optimization problem from a linear problem
2. Solve a 2-decision variable linear problem with the graphical technique

1. Differentiate general optimization problem from a linear one

General formulation

Maximize Z = f(x) or: Minimize Z = f(x) [x under Max to ID controls]

Subject to: $g_m(x) \le b_m, \forall m$ [for each instance m]

Linear formulation

Maximize Z = **(or minimize)**

such that:

$c_1, c_2, \ldots c_n =$
$a_{11}, a_{12}, \ldots a_{1n}, a_{21}, a_{22}, \ldots a_{2n}, \ldots, a_{m1}, a_{m2}, \ldots a_{mn} =$
n =
m =

More concisely:
Maximize (of minimize) Z =
Such that $A\mathbf{x} \le b$

c = [1 n] vector of
A = [m x n] matrix of
b = [1 x m] vector of

2. Graphical Solution Technique

1. Formulate as a linear problem
2. Plot each decision variable on an axis
3. Plot each constraint
4. Identify the feasible region from the constraints
5. Plot contours of the objective function until reach maximum within the feasible region

Example 1. (Chapter 2, Problem 1).

How many acres of eggplants and tomatoes to plant?