

Introduction to Management Science

Lecture 1



Syllabus

L i n e a r P r o g r a m m i n g

I n t e g e r P r o g r a m m i n g

N e t w o r k M o d e l s

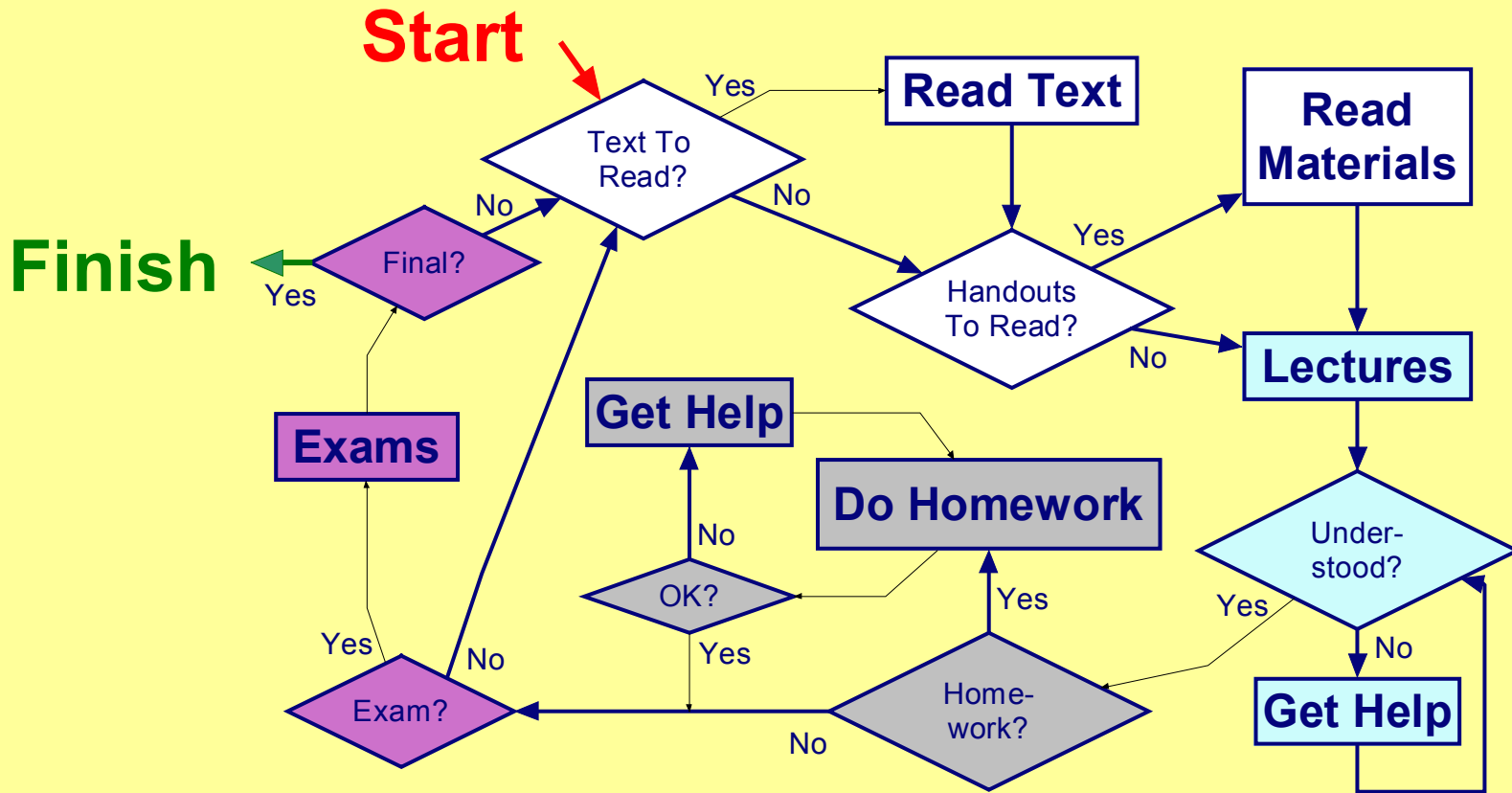
P r o j e c t M a n a g e m e n t

D e c i s i o n T h e o r y

Q u e u i n g T h e o r y



Procedures



Management Science

- Definition - All of the following:
 - The art of investigation and analysis.
 - The art of diagrammatical and then mathematical modeling of complex situations.
 - The development of techniques to solve these models.
 - Using the techniques to obtain solutions.
 - Effective communication of the results.
 - Maintenance of the system.



A Simple Example

Rao's buys coffee from two suppliers, one in Nicaragua and one in Costa Rica. A pound of Nicaraguan coffee costs \$3.35 and a pound of Costa Rican coffee costs \$4.45. Rao's needs at least 6,000 pounds of coffee. Nicaragua has 3,500 pounds available, and Costa Rica has 4,000 pounds available.



How Do We Approach This?

1. What is the problem?
2. What is the set of alternative solutions?
3. What are the criteria that will be used to evaluate the alternatives?
4. Evaluate the alternatives.

So let us use our definition of
Management Science!



Investigation and Analysis

- In any classroom problem the investigation and much of the analysis have been done for you to set out the question/problem.
- Note that we are assuming
 - No better coffee is available more cheaply than \$4.45 a pound.
 - Rao's want to buy coffee at the lowest cost.



Diagrammatically

Coffee available at \$3.35 a pound.

Coffee available at \$4.45 a pound.

3,500 lbs Nicaraguan coffee

4,000 lbs Costa Rican Coffee

Some Quantity of coffee
from Nicaragua.

Some Quantity of coffee
from Costa Rica.

Rao's Coffee Bar want at least 6,000 lbs of coffee
at the lowest possible cost

Total Cost will be
(Quantity of coffee from Nicaragua. * \$3.35) plus
(Quantity of coffee from Costa Rica * \$4.45)



Mathematically

- Let N be the "Some Quantity of coffee from Nicaragua" in pounds.
- Let C be the "Some Quantity of coffee from Costa Rica" in pounds.
- Let $\text{Cost} = (N * \$3.35) + (C * \$4.45)$
- Let Total Weight of Coffee be $(N + C)$, where $(N + C) \geq 6,000$ pounds.
- Minimize Cost.



Mathematically cont...

- $\text{Min } (N * \$3.35) + (C * \$4.45).$
- $N + C \geq 6,000$ pounds.
- $N \leq 3,500$ pounds.
- $C \leq 4,000$ pounds.
- $N \geq 0$ pounds.
- $C \geq 0$ pounds.



Developing Techniques to Solve the Models

- Fortunately for all of us this is beyond the scope of this class.
- We will use a number of techniques that have been developed to address various models in the coming weeks.
- We will stick to linear problems and techniques.



Effective Communication of the Results

- If you want the work you do to be taken seriously it must be communicated clearly, effectively and with the minimum of jargon and mathematical symbols.
- You should bear “political realities” in mind. Do not make recommendations which will be ignored.



Sensitivity Analysis

- What happens if the price of Nicaraguan coffee changes?
- What happens if Costa Rica only has 2,500 lbs of coffee available?
- What happens if Rao's only needs 4,000 pounds of coffee?
- What if they need 9,000 pounds of coffee?

