Offshore Production Problem

# 1. Problem Statement

We have 2 offshore production plants in 2 locations and an estimated demand for our products.

We want to produce a schedule of production from both plants that meets our demand with the lowest cost.

A factory can be in 2 states:

* Off – Producing zero units
* On – Producing between its minimum and maximum production capacities

# 2. Sets and Indices

## 2.1. Sets

*I*: set of all factories, I = {0,1}

*J*: set of all months, J = {0,1,2.….11}

## 2.2. Indices

*i*: Denotes the factory number/index,

*j*: Denotes the month number/index,

# 3. LP Formulation

Formulating the problem as a MILP problem

## 3.1. Decision Variables

* : Quantity produced in factory ‘i’ in month ‘j’

All are integers as quantity produced can’t be a fraction

* Represents the open or closed status a factory ‘i’ in month ‘j’

## 3.2. Parameters

Variable cost of production in factory ‘i’ in the month ‘j’

Fixed cost of production in factory ‘i’ in the month ‘j’

Demand to be met at month ‘j’

Minimum quantity that should be produced by factory i in month j

Maximum quantity that should be produced by factory i in month j

## 3.3. Objective Function

## 3.3. Constraints

* Production-Demand Constraint:

The sum of quantities produced from each of the factories in a month must be equal to the demand in that month

* Capacity constraints
  + Minimum capacity constraint:

Production at each factory a month should be greater than the minimum production limit of the factory that month given that the factory is open in that month

* + Maximum capacity constraint:

Production at each factory a month should be less than the minimum production limit of the factory that month given that the factory is open in that month

* Sign Constraints:

The decision variables for production quantity considered should be non-negative