**Maintenance Planning**

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Example from: <https://nbviewer.jupyter.org/github/jckantor/ND-Pyomo-Cookbook/blob/master/notebooks/04.03-Maintenance-Planning.ipynb>

**Problem Statement**

A factory is operating over a maintenance planning horizon from 1 to  days. On day  the factory makes a profit  which is known in advance. The factory needs to shut down for  maintenance periods during the planning period. Once started, a maintenance period takes  days to finish.

**Object**

Find a maintenance schedule that allows the maximum profit to be produced.

## Modeling

The model is comprised of several sets of the binary variables indexed 1 to .

1. Binary variable  correspond to the operating mode of the factory, with  indicating the factory is operating on day  and able to earn a profit .
2. Binary variable  indicates the first day of a maintenance period during which the factory is not operating and earning 0 profit.
3. Binary variable indicates the start of an operational period, this can be used in constraint when the factory can operate no more than days without a maintenance shutdown.
4. *The planning objective is to maximize profit*

subject to completing maintenance periods.

#### Number of planning periods is equal to P and completing P planning periods requires

1. *No more than one maintenance period can start in any consecutive set of M days.*

#### The factory must shut down for M days following a maintenance start.

The final requirement is a disjunctive constraint that says either  or the sum , but not both. These disjunctive constraints can be implemented using the big-M method. In particular,

1. The factory can operate no more than days without a maintenance shutdown