31\8\12

Simple model : demand d_j , period j

cost $c(x)$ to make x

H = max. amount that can be stored.

Extensions

(a) Holding cost : $h(i,j)$: i = starting inventory] of a period
j = ending inventory]

$$f_r(i) = \min_x \left\{ c(x) + h(i, i+x-d_r) + f_{r+1}[i+x-d_r] \right\}$$

(b) Allow back-orders, up to amount B.

Cost of b per unit per period of delay

Represent unfilled demand as negative inventory

$$f_r(i) = \min_{x} \left\{ c(x) + b(d_j - x - i)^{+} + f_{r+1}(i + x - d_r) \right\}$$

$-B \leq i \leq H$

$$\xi^{+} = \max\{\xi, 0\}$$

(c) Two products. Cost of making x of product 1 and y of product 2 is $C(x, y)$

Demand $d_r^{(1)}$ & $d_r^{(2)}$, $\leq H$ of each is allowed in stock.

$$f_r(i_1, i_2) = \min_{x, y} \left\{ C(x, y) + f_{r+1}\left(i_1 + x - d_r^{(1)},\ i_2 + y - d_r^{(2)}\right) \right\}$$

More things to compute: $H^2 n$

$r = 1, 2, \dots, n$

$\vdots$

k products $H^k n$ things to compute

(d) Production smoothing.

Suppose there is a cost $\sigma(|x_r - x_{r-1}|)$ attributable to period r.

$$f_r(i, \xi) = \min_x \left\{ c(x) + \sigma(|x - \xi|) + f_{r+1}(i + x - d_r, x) \right\}$$

last period production