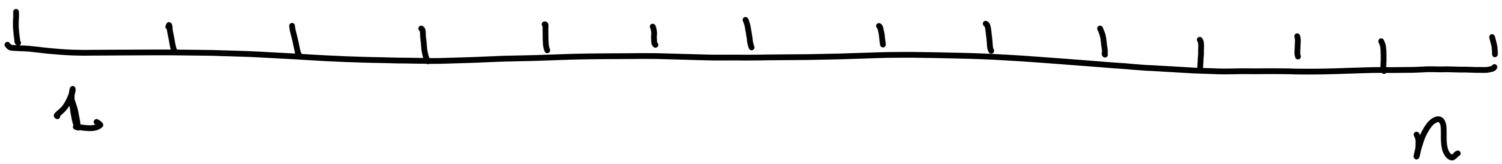
9\9\11

Variations on production problem:

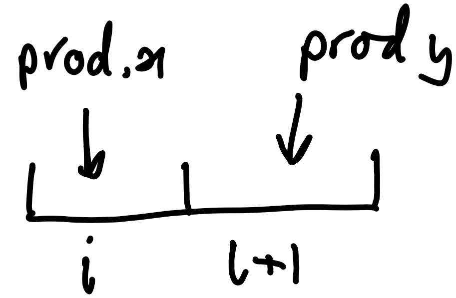


Demand: $d_1, d_2, \dots, d_n$

Max. inventory H

Cost of production $c(x)$

Smoothing penalty:



for every period add

$p(x,y)$

e.g. $(x-y)^2$

$$f_r(i,y) = \min_x \left[c(x) + p(x,y) + f_{r+1}(i + x - d_j; x) \right]$$

Machine Replacement.

As a machine gets older, it costs more to produce:

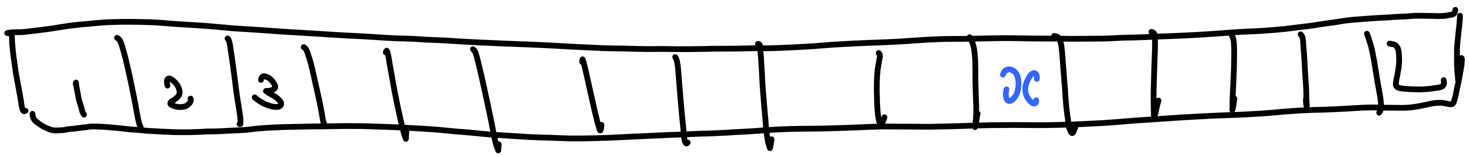
$C_t(x) =$ cost of producing x on a machine of age t. [Increase with t]

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

Now suppose cost of buying a new machine is B

$$f_r(i,t) = \min \begin{cases} \min\limits_{x} \left[c_t(x) + f_{r+1}(i+x-d_r, t+1) \right] \\ \min\limits_{x} \left[B + c_0(x) + f_{r+1}(i+x-d_r, 1) \right] \end{cases}$$

LINEAR TOWN:



DIVIDE STRIP $1..L$ INTO PIECES FOR DEVELOPMENT.

$v[i,j]$ = value of strip $[i, i+1, \ldots, j]$

Problem: find partition into pieces that maximises total value

$f(l)$ = maximum obtainable from cutting up $[1..l]$

$$= \max_{0 \le x < l} \left[v[x,l] + f(x-1) \right] \quad O(L^2) \text{ time}$$

Now suppose we want to make exactly k cuts.

$f(l, k)$ = max from $1..l$ using k cuts

$$= \max_{0 \le x < l} \left[v[x, l] + f(x-1, k-1) \right]$$

$$f(l, k) = -\infty \text{ if } k > l$$