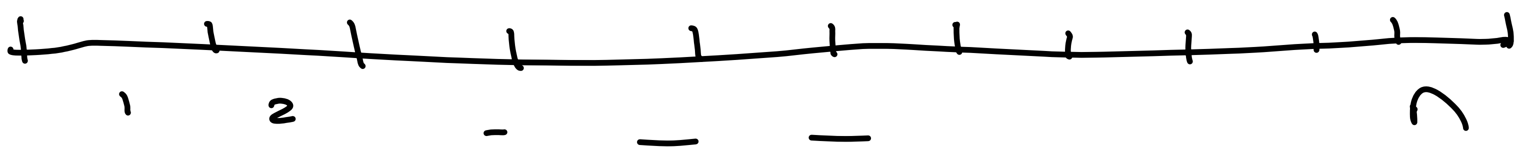
9/2/09

Replacement of a machine:



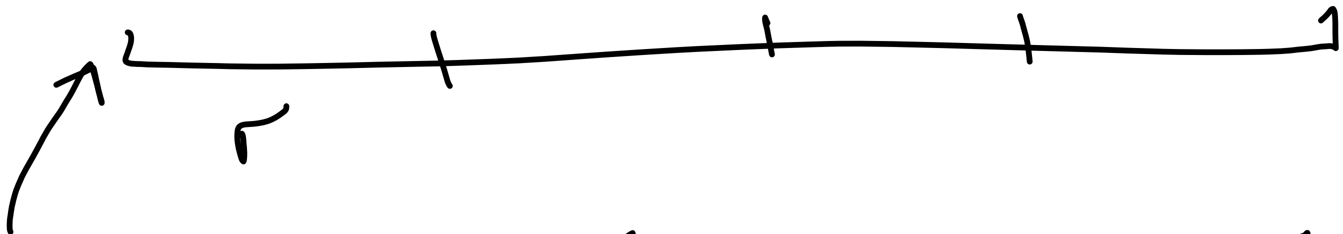

n periods

$d_j$ = demand in period j

H = max. inventory

$c(x, t)$ = cost of making x with machine age t

M = cost of a new machine.



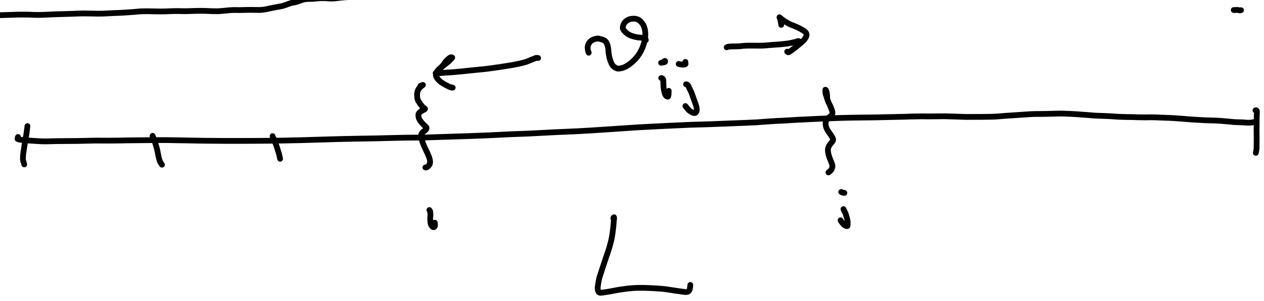

What is "state". [used to be i]

keep old

$$f_r(i,t) = \min \begin{cases} \min\limits_{x} \left[ c(x,t) + f_{r+1}(i+x-d_r, t+1) \right] \\ \min\limits_{x} \left[ M + c(x,0) + f_{r+1}(i+x-d_r, 1) \right] \end{cases}$$

replace

## Chopping a stick



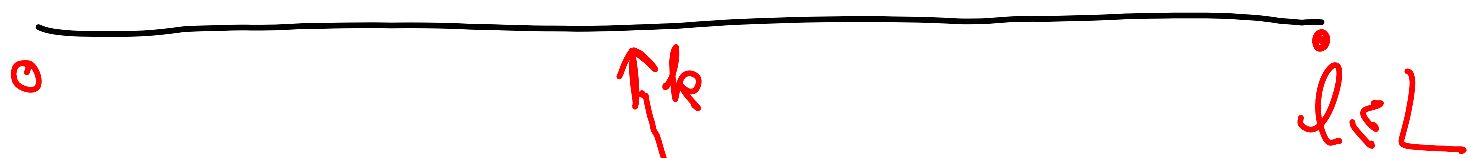

If you "chop" at $i_1, i_2, \ldots, i_k$ get

$$\vartheta_{i_0, i_1} + \vartheta_{i_1, i_2} + \qquad + \vartheta_{i_k, i_{k+1}}$$

$i_0 = 1$

$L$

# of chopping strategies is $2^L$



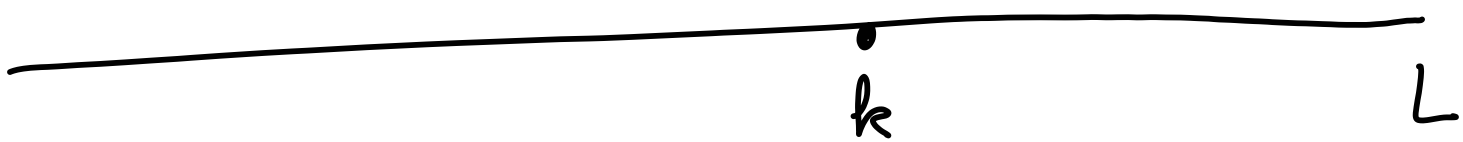

Decision: where to make last cut

$$f(l) = \text{max. achievable from } 0, 1, \ldots, l$$

$$= \max_{\substack{k = 0, 1, \ldots, l-1 \\ \text{last cut}}} \left[ v(k,l) + f(k) \right]$$

Running time $= O(L^2)$

Now suppose we have to make $r$ cuts




$$f(s,l) = \max\{0,1,\dots,l \text{ given } s \text{ cuts}\}$$

$$= \max_{k \geq s} \{ v(k,l) + f(s-1,k) \}$$

Running time $= O(rL^2)$