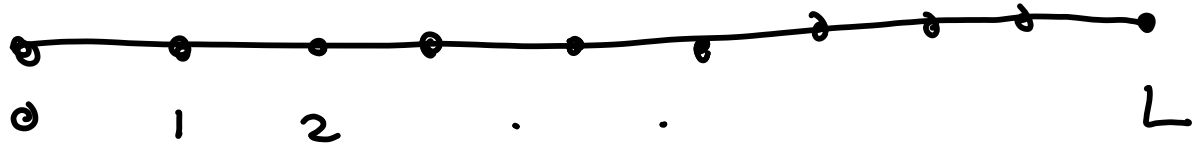
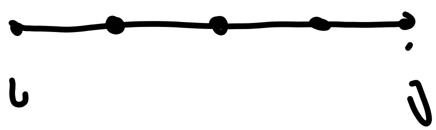
9\3\10



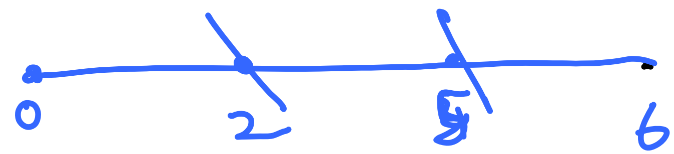
Stick of length L (or stretch of highway) that has to be broken into pieces.

(leasing land in parcels along the highway)

A piece



has value v_{ij}.



$v_{0,2} + v_{2,5} + v_{5,6}$

$\boxed{v_{i,i} = 0, \ \forall i}$

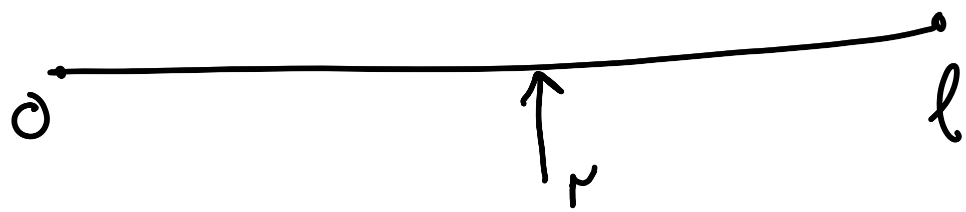
Problem: maximise total value

Many ways of breaking stick (2^{L-1})

General approach for D.P.: think that the answer is a sequence of decisions. Given first decision, face a smaller problem.

Here, decisions $\equiv$ cuts

$f(\ell)$ = maximum value from



$$f(\ell) = \max_{0 \leq r < \ell} \left[v_{r,\ell} + f(r) \right]$$

$O(L^2)$ time to implement

Suppose I must have k pieces.

$$f(k,\ell) = \max_{0 \leq r < \ell} \left(v_{r,\ell} + f(k-1, r) \right)$$

$[\ f(k,\ell) = -\infty \text{ if } k > \ell\ ]$

$O(kL^2)$ operations.

Production problem with machine replacement.

Up to now

$H, d_1, \dots, d_n$

$c(x)$

now

$H, d_1, \dots, d_n$

$c(x, t)$

t = age of the machine

A

cost of replacement

$$f_n(t, h) = \min \begin{cases} \min\limits_{x} \left[c(x, t) + f_{n+1}(t+1, h+x-d) \right] & \text{keep old machine} \\ \min\limits_{x} \left[A + c(x, 0) + f_{n+1}(1, h+x-d) \right] & \text{replace machine} \end{cases}$$

age of current machine

amount in stock

Easy to add a 3rd alternative.

Do some maintenance at cost B to get a 3 year old machine.