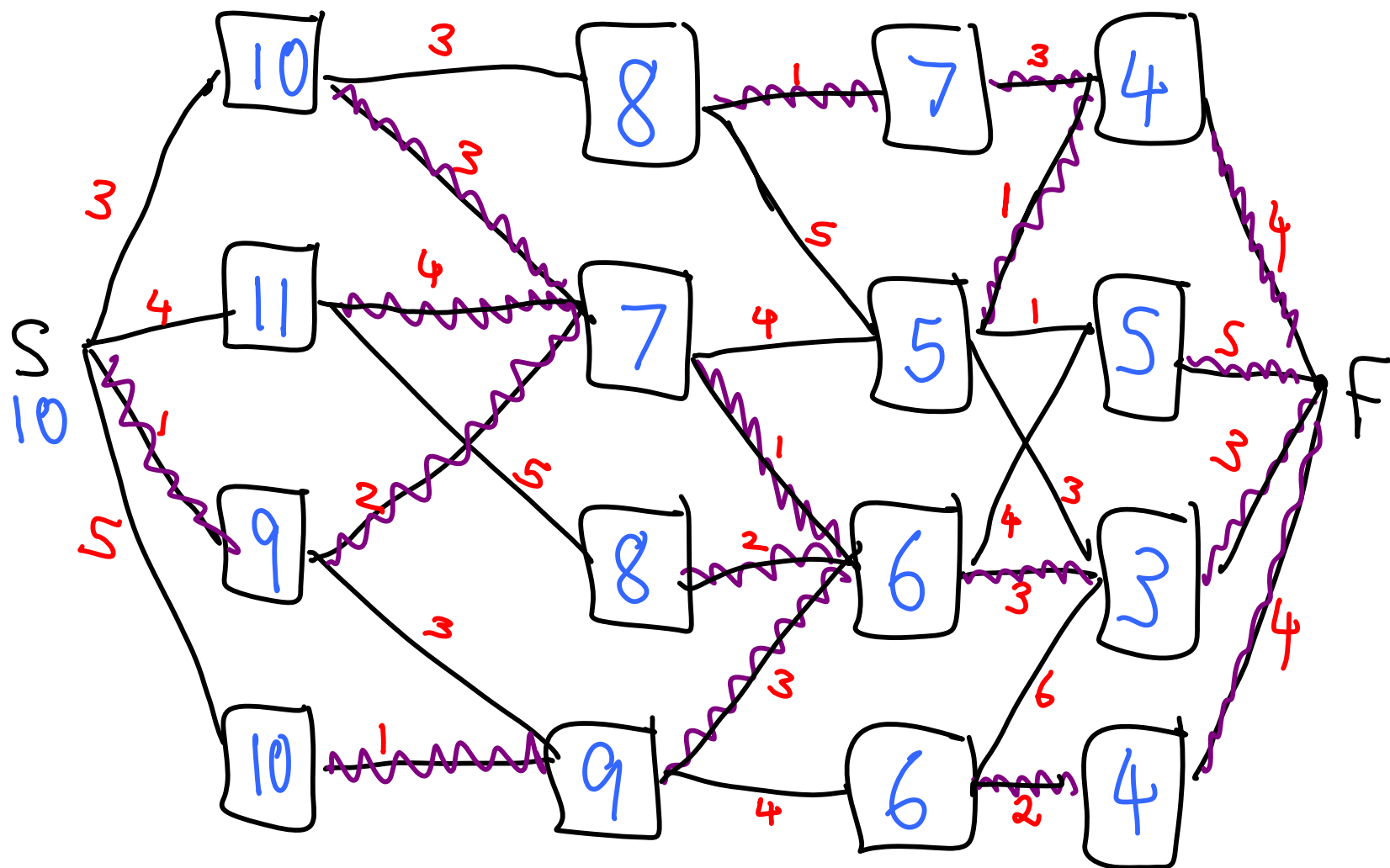




Simple Production Problem

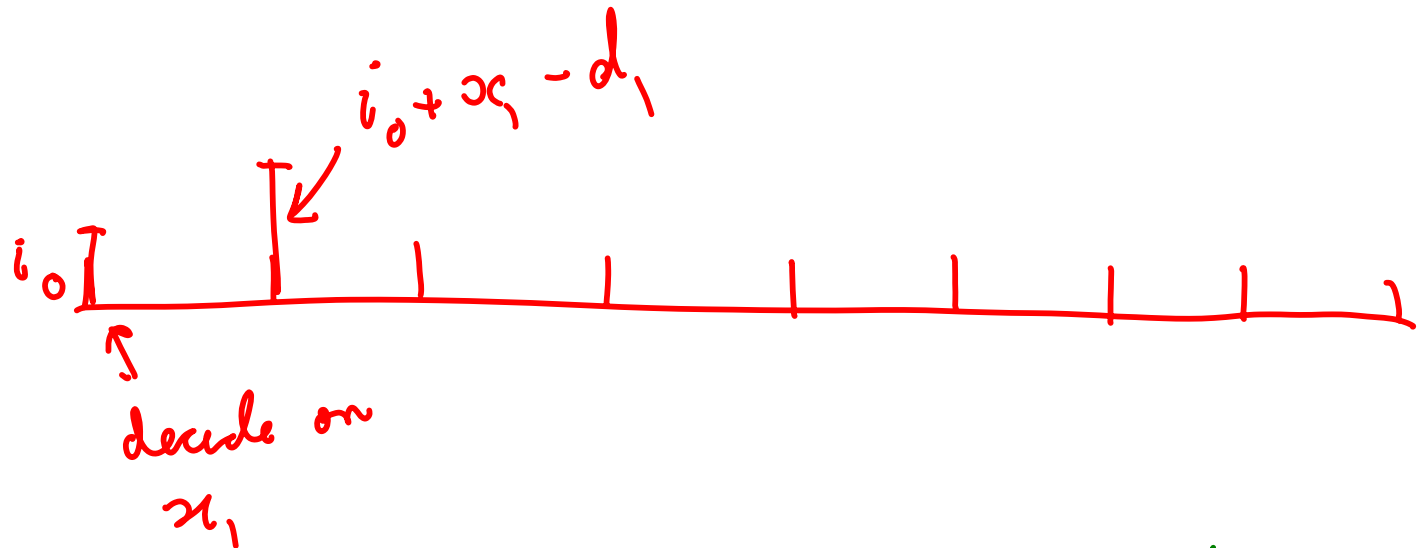
scheduling production over next n periods



- 1) We manufacture one type of item.
- 2) The demand in period i is d_i units
- 3) Demand must be met.
- 4) Cost of making x units in one period is $c(x)$.

5) You can keep extra production in store.
Maximum storage is H_- .

Start with i_0 in stock.



$f_r(i)$ = minimum cost of meeting
demand in $r, r+1, \dots, n$
starting with i in stock.

Recurrence:

$$f_r(i) = \min_{\substack{x \geq 0 \\ d_r \leq i+x \leq H+d_r}} \left[c(x) + f_{r+1}(i+x-d_r) \right]$$

↑
cost of period r

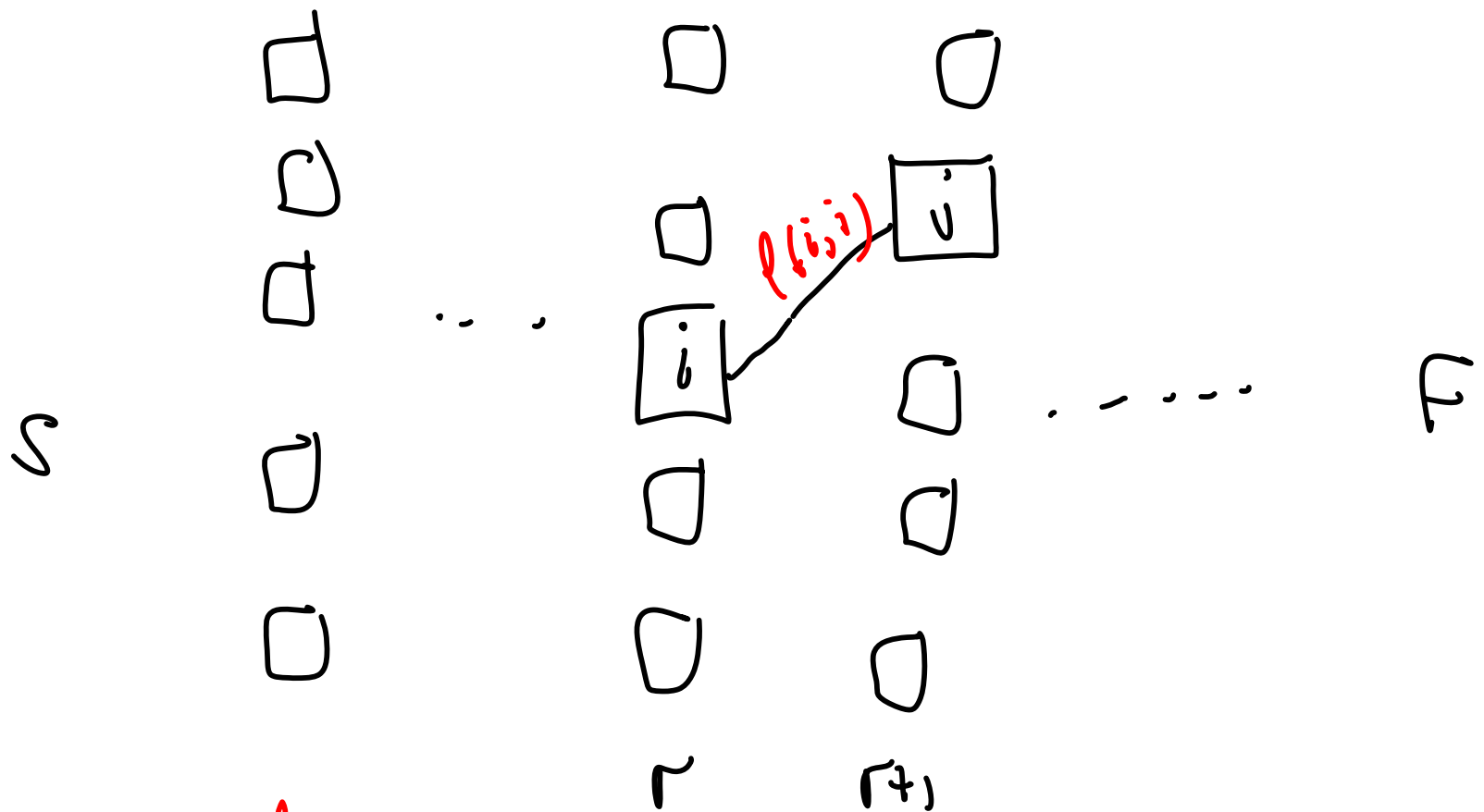
↑
cost of periods r+1, r+2, ..., n

$$f_{n+1}(i) = 0.$$

Compute $f_n, f_{n-1}, \dots, f_1$

$$\text{Time} = O(\underbrace{n}_{\#r} \times \underbrace{H}_{\#i} \times \underbrace{H}_{\text{best } x \text{ find}})$$

Relationship with shortest path problem:



$$l(i,j) = c(j + d_r - i)$$

if $j + d_r \geq i$