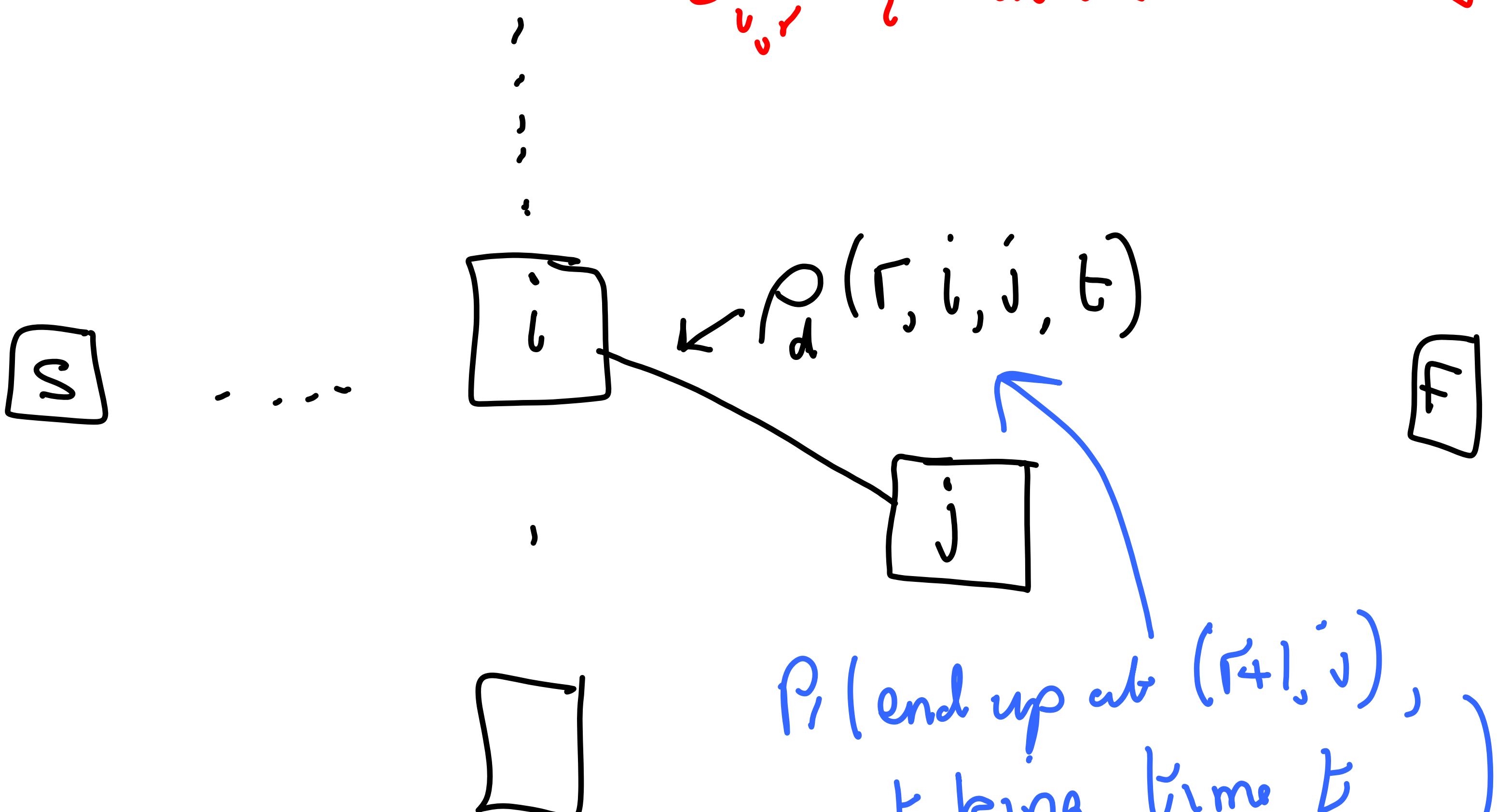
9/8/10

Probabilistic Shortest Path

$D_{i,r}$ = {decisions available}



$P_d(r, i, j, t)$

P_1(end up at $(r+1, j)$, taking time t)

Strategy to minimize expectation:

Assume first, decision is made befor dice is rolled.

$$f_r(i) = \min_{d \in D(r,i)} \left[\sum_{\substack{t \geq 0 \\ j}} p_d(r,i,j,t)\left(t + f_{r+1}(j)\right) \right]$$

minimum expeted time to reach $\boxed{F}$

Suppose that we want to arrive before time T.

$$g_r(i,t) = \underset{\text{decisions}}{\text{maximum}}\ \Pr\left(\text{reaching } \boxed{F} \text{ before } T \text{ given you are at } (i,r) \text{ at time } t\right)$$

$$= \underset{d \in D(i,r)}{\text{maximum}} \left[\sum_{\tau, j} p_d(r,i,j,\tau)\, g_{r+1}(j, t+\tau) \right]$$

$$g_{N+1}(F,t) = \begin{cases} 1 & t \le T \\ 0 & t > T \end{cases}$$