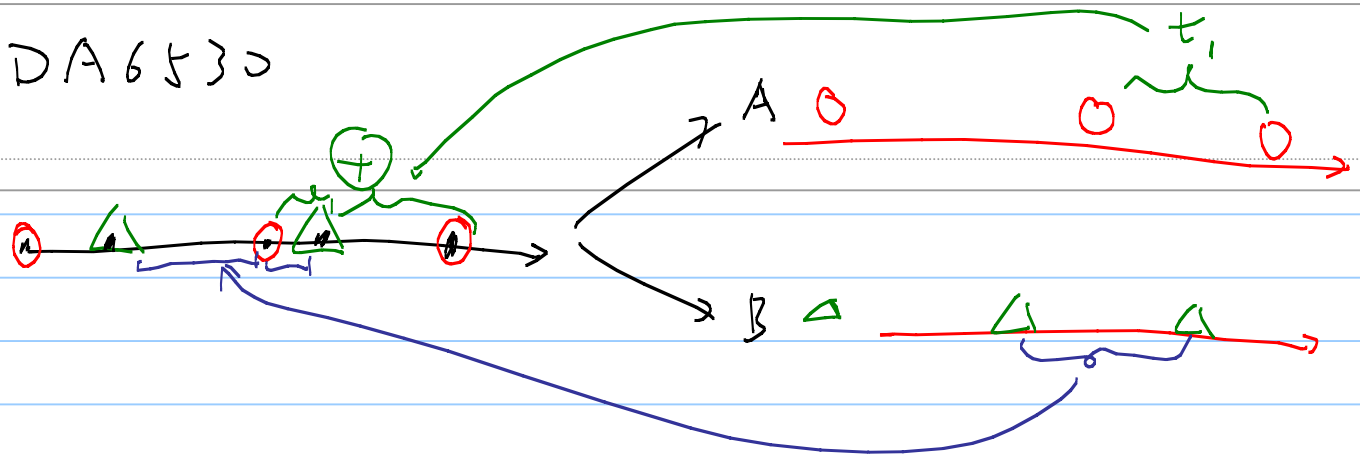
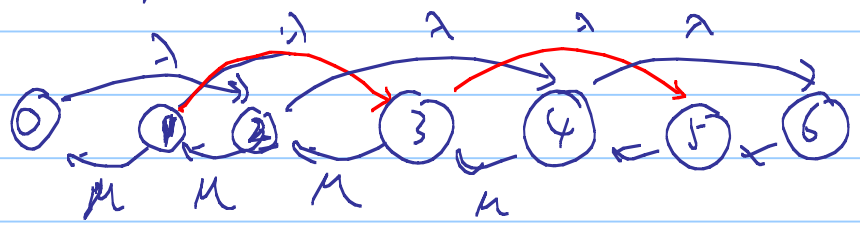
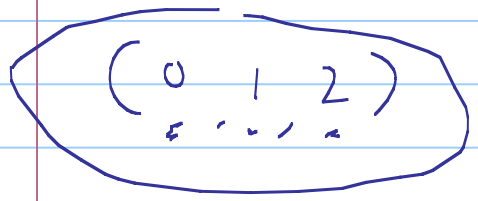
CDA6530

Note Title 10/13/2011



$E[T] = \frac{1}{\mu - \lambda}$





Define the following six states:

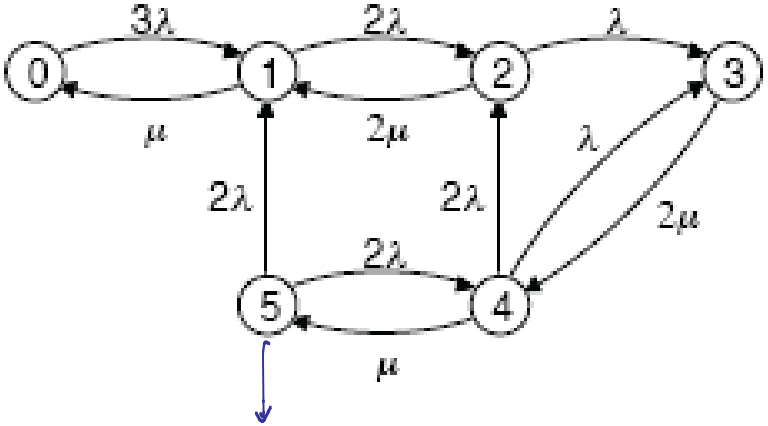
0	no calls in progress, 3 callers idle
1	1 call in progress, 2 callers idle
2	2 calls in progress, 1 caller idle
3	2 calls in progress, 1 caller impatient
4	1 call in progress, 1 caller impatient
5	0 calls in progress, 1 caller impatient

call in progress

in impatient

(0, 3)
(1, 2)
(2, 1)
(1, 1)
(0, 1)

The state transition diagram is



$$Q = \begin{bmatrix} -3\lambda & 3\lambda & 0 & 0 & 0 & 0 \\ \mu & -\mu-2\lambda & 2\lambda & 0 & 0 & 0 \\ 0 & 2\mu & -2\mu-\lambda & \lambda & 0 & 0 \\ 0 & 0 & 0 & -2\mu & 2\mu & 0 \\ 0 & 0 & 2\lambda & \lambda & -\mu-2\lambda & \mu \\ 0 & 2\lambda & 0 & 0 & 2\lambda & -2\lambda \end{bmatrix}$$

$$\begin{cases} \pi Q = 0 \\ \pi \mathbf{1} = 1 \end{cases}$$

$$\pi \left[\, Q' \,\right] = (1\ 0\ 0\ 0\ 0\ 0)$$

The rate generator matrix is

2 in idle, 1 impatient → (4)

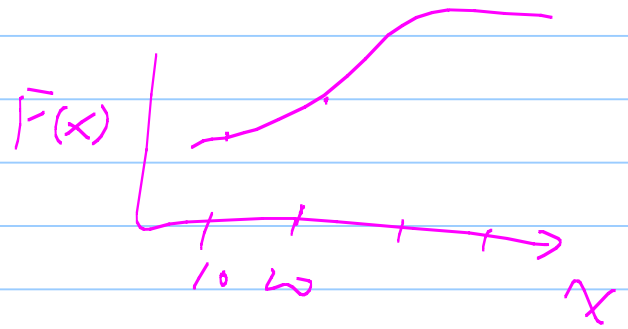
→ (1)

#1 machine

(0, 1, 2)

$\pi = [0.26 \quad 0.4 \quad 0.07 \quad 0.27]$

(3, 0, 0) (2, 0, 1) (0, 2, 1) (1, 1, 1)

3 2 0 1 working

$E[N] = 3 \times 0.26 + 2 \times 0.4 + 1 \times 0.27$