Distribution of length of stay - Continuous parameter Markov chain processes (cont.)

Now for any $a, h \geq 0$,

$$\begin{aligned} P[T_i \geq a+h | T_i \geq a] &= \frac{P[T_i \geq a+h]}{P[T_i \geq a]} \\ &= \frac{P[N(t)=i, s<t\leq s+a+h | N(s)=i]}{P[N(t)=i, s<t\leq s+a | N(s)=i]} \\ &= . \\ &= . \\ &= P[T_i \geq h] \end{aligned}$$

Your turn: Complete the intermediate steps.

cont. . .

cont. . .

cont. . .

cont...

Definition 2: A continuous parameter stationary Markov process is a stochastic process having the properties that

1. Each time it enters state i, the amount of time it spends in that state before making a transition into a different state is exponentially distributed (say with rate ν_i or mean $\frac{1}{\nu_i}$),

and

2. When the process leaves state i, it enters state j with some probability, p_{ij} satisfying,

$$P_{ii} = 0 \text{ all } i$$
$$\sum_j P_{ij} = 1 \text{ all } i$$

cont. . .

cont. . .

cont. . .

cont. . .

cont. . .

cont. . .