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MIDSEM TEST

Missing Values

X	A	B	C
5.1	6	1.8	2.2

Question 1

$$N_t \sim Poisson(5.1t)$$
$$N_t - N_s \sim Poisson\big(5.1(t-s)\big)$$

a. The inter-event time follows a Poisson Distribution
b. $E(N_t - N_s) = 5.1(t-s)$
c. $E(N\_6) = Mean(Poisson(5.1 * 6)\ = \ 30.599999999999998\ \approx 30.6$
d. $\Pr\big(N_3 > 1.8 + E(N_2)\big) =$
$$\mathrm{E}(X_2) = 10.2$$
$$\Pr[N_3 > 10.2 + 1.8] = 0.7564968855759098$$
e. $Pr(N_2 > 2.2) = 0.9976500924527895$

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Question 2

a. For the chain to be an absorbing Markov process, every state must be able to reach a state that is absorbing. So a, b both have to be 1 since we could start at either state 1 or state 2, and since both states are absorbing the chain will be considered an absorbing Markov process. Another option would be to direct to only one state, i.e. a->b only or b-> a only. So (a = 0, b = 1) or (a = 1, b = 0) respectively.
b. For a continuous-time Markov chain to be an absorbing Markov process the generator matrix, $A = [\{(-a), a\}, \{b, (-b)\}]$, the rows should equal to 0 and However the
c. Given enough cycles, the distribution matrix for the Markov chain will eventually become a stationary distribution

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Question 3

a. P =
   [0, 0.5, 0.5,
   0.5, 0, 0.5,
   0.5, 0.5, 0]
b. Pr(period = 2) = 1/4
   a -> b -> a
   a -> c -> a
   b -> a -> b
   b -> c -> b
   c -> a -> c
   c -> b -> c
c. D = [
   0.5
   0.5
   0.5]
   Final distribution = D*P = [0.5, 0.5, 0.5]
   The final distribution does not change regardless of where the starting state is, since every final position is equally likely.

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Question 4

Missing Values

0.076404	0.195743	0.371898
X	Y	Z

$$6q58 = 58p * (1 - 6p58)$$

_tq_x = (1 -_tp_x) = $1 - E^{\left(-\int_0^5 (\mu_{55+5})\, dS\right)}$

$$\mu_{60} \rightarrow 0.51434404563185$$

$$1 - E\hat{}(-\int_0^{10} (\mu_{x+s})\, dS) == 1 - 0.195743$$

$$1 - E\hat{}(-\int_0^{15} (\mu_{x+s})\, dS) == 1 - 0.371898$$

Mu_x = Bc^x

Equations:

Mu_60 = Bc^60 = 0.51434404563185

Mu_65 = Bc^65 = Type equation here.

Mu_70 = Bc^70 = Type equation here.

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Question 5