ISYE 3232A Spring 2016 Quiz 8

April, 2015

Name: _____

Consider a CTMC $X = \{X(t), t \geq 0\}$ on $S = \{A, B, C\}$ with generator $\underline{G}$ given by

$$\underline{G} = \begin{bmatrix} -10 & ? & 2 \\ 2 & ? & 6 \\ 5 & ? & -7 \end{bmatrix}$$

(a) Determine the missing elements of $\underline{G}$.

$$\underline{G} = \begin{bmatrix} -10 & 8 & 2 \\ 2 & -8 & 6 \\ 5 & 2 & -7 \end{bmatrix}$$

(b) Find the roadmap matrix $\underline{R}$ (i.e., the transition matrix for the corresponding embedded DTMC for X).

$$\underline{R} = \begin{bmatrix} 0 & 8/10 & 2/10 \\ 2/8 & 0 & 6/8 \\ 5/7 & 2/7 & 0 \end{bmatrix}$$

(c) Set up equations to calculate the long-run fraction of time for each state. (Just set them up but do not attempt to solve them.)

$$\begin{aligned} 10\pi_A &= 2\pi_B + 5\pi_C \\ 8\pi_B &= 8\pi_A + 2\pi_C \\ \pi_A + \pi_B + \pi_C &= 1 \end{aligned}$$