CMPSCI 240: Reasoning Under Uncertainty Discussion 6

| Name: _ | ID: | |
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The cat: My friend has a cat who is always either sleeping, eating, or watching tv. Every hour she potentially changes her state:

- If she was sleeping, she keeps sleeping with probability $\frac{1}{2}$ and starts eating with probability $\frac{1}{2}$.
- If she was eating, she keeps eating with probability $\frac{1}{3}$ and starts watching tv with probability $\frac{2}{3}$.
- If she was watching tv, she starts sleeping with probability 1.

Question 1: Draw the transition graph and transition matrix for the Markov Chain described above.

Question 2: Initially, the cat is sleeping. After 3 hours, what is the probability that she is watching tv?

Question 3: Suppose my friend doesn't know what the cat was doing during the last hour (he wasn't home). In particular, suppose the cat was equally likely to be in each of the 3 states. What is the probability the cat will be sleeping next?

Question 4: Suppose the cat is sleeping with probability $\frac{4}{9}$, eating with probability $\frac{1}{3}$, and watching tv with probability $\frac{2}{9}$. What is the probability the cat is in each of the three states at the next step?

Question 5: Suppose the cat consumes 10 calories while sleeping, -20 calories when eating, and 15 calories while watching tv. The cat is sleeping from 5pm until 5.59pm. How many calories do we expect the cat to consume from 6pm-7.59pm?