Name:

Quiz 7: §7.6 & 7.7

Complete the following problems to the best of your ability. **SHOW ALL OF YOUR WORK.** Unshown work will not be graded. You may use a calculator.

1. [40] Suppose you got woken up in the morning by a thunderstorm. You read yesterday that today had a 50% chance of light rain and a 30% chance of heavy rain. You also read that there is a 5% chance of thunder if it's not raining, a 20% chance of thunder if it's raining lightly, and a 70% chance of thunder if it's raining heavily. You know that there's a thunderstorm outside; what is the probability that it's raining heavily?

2. [60] Suppose there are three rides at a fair; the Tunnel of Mutual Respect, the Blackout Freefall, and the Spinning Vomitorium. Observing patterns of people going from one ride to the other (and excluding people who leave the park) at a time step of one hour, we observe the following:

   - Of people who just rode the Tunnel, 40 % go to the Freefall, and 30% go to the Vomitorium.
   - Of people who just rode the Freefall, 20% go to the Tunnel, and 30% go to the Vomitorium.
   - Of people who just rode the Vomitorium, 60% go to the Tunnel, and 30% go to the Freefall.

   (a) If the Tunnel is state 1, the Freefall state 2, and the Vomitorium state 3, draw a diagram of this Markov System.

   (b) Give the transition matrix for this Markov system.

   (c) Suppose at midday, 40% of ride-goers are on the Tunnel, 35% on the Freefall, and 25% in the Vomitorium. Assuming that nobody leaves the park, what will the distribution of ride-goers be in two hours?