

MASSACHUSETTS INSTITUTE OF TECHNOLOGY
Department of Electrical Engineering and Computer Science
6.01—Introduction to EECS I
Spring Semester, 2008

NanoQuiz Week 12: Sections 1 and 2

Name:

You are a robot in a long hallway. You have a single action, `moveRight` and you can observe the color of the square you are in. Each *step* involves doing an action and making an observation.

- The squares are numbered starting at 0 for the leftmost square.
 - You start out with a probability of 0.7 of being in square 0 and a probability of 0.3 of being in square 1.
 - The `moveRight` action has a probability of 0.1 that you don't move and a probability of 0.1 that you move one square too far, and probability 0.8 of going one square to the right;
 - When you do an observation, there is 0.8 chance that you will see the correct color of the square you are in and a 0.2 chance that the sensor will fail and return "black" (which is not a valid hallway color).
1. Assume all the squares in the hallway are white. What is the belief state after one step, assume that the sensor returns "white". Compute the probability values for the states with non-zero probabilities. You don't have to multiply or divide, just show the numerical expressions.
 2. What would the belief state have been if the sensor had returned "black"? Explain the difference, you need not recompute.
 3. Now, assume that the hallway has a pattern of three successive colors (red, green, blue, red, green, blue, etc.) as you move from left to right. What is the belief state after one step, assume that the sensor returns "red". Compute the probability values for the states with non-zero probabilities. You don't have to multiply or divide, just show the numerical expressions.