A robot uses a range sensor that can measure ranges from 0\text{m} to 3\text{m}. For simplicity, assume that actual ranges are distributed uniformly in this interval. Unfortunately, the sensor can be faulty. When the sensor is faulty, it constantly outputs a range below 1\text{m}, regardless of the actual range in the sensor’s measurement cone. We know that the prior probability for a sensor to be faulty is \( p = 0.01 \).

Suppose the robot queried its sensor \( N \) times, and every single time the measurement value is below 1\text{m}. What is the posterior probability of a sensor fault, for \( N = 1, 2, \ldots, 10 \)? Formulate the corresponding probabilistic model.

Hint: Evidence is build up when the sensor is queried, so the normalizer in Bayes rule can’t be ignored.

**Hand-In**

You do not have to hand-in this assignment. This assignment is intended to revitalize your understanding of conditional probabilities. The solution of this assignment is discussed in the classroom this Tuesday. You should have a MatLab diary or Mathematica notebook with you, with your calculations to find the posterior for \( N = 1, 2, \ldots, 10 \).