EECS 70 Discrete Mathematics and Probability Theory
Fall 2014 Anant Sahai

Discussion 9W

1. Balls and Bins

You have n empty bins and you throw balls into them one by one randomly. A collision is when a ball is thrown into a bin which already has another ball.

(a) What is the probability that the first ball thrown will cause the first collision?

(b) What is the probability that the second ball thrown will cause the first collision?

(c) What is the probability that, given the first two balls are not in collision, the third ball thrown will cause the first collision?

(d) What is the probability that the third ball thrown will cause the first collision?

(e) What is the probability that, given the first $m-1$ balls are not in collision, the m^{th} ball thrown will cause the first collision?

(f) What is the probability that the m^{th} ball thrown will cause the first collision?

2. Rain and Wind

The local weather channel just released a statistic for the months of November and December. It said that the probability that it would rain on a windy day is 0.3 and the probability that it would rain on a non-windy day is 0.8. The probability of a day being windy is 0.2. As a student in EECS70, you are curious to play around with these numbers. Find the probability that

(a) A given day is windy and rainy.

(b) It rains on a given day.

(c) Exactly one of any two days is rainy.

(d) A non-rainy day is also non-windy.

3. Boy or Girl Paradox

Mr. Smith has two children, at least one of whom is a boy. What is the probability that both children are boys?