EE5110: Probability Foundations for Electrical Engineers

July - Nov 2024

1 Counting

1.1 References

- See Chapter 1: Sample Space and Probability, Bertsekas and Tsitsiklis, for a review of Counting.

- See Chapter 1: Combinatorial Analysis, Sheldon M Ross, for a review of Counting.

1.2 Practice Problems

1. How many different 7-length license plates are possible if the first 3 places are to be occupied by letters and the final 4 by numbers?

2. (Ross): How many different letter arrangements can be formed from the letters PEPPER?

3. Suppose we throw n distinguishable balls into one of the r distinguishable bins. What is the number of possible distinct outcomes? Are all the outcomes equally likely?

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5. (Ross): If 3 balls are "randomly drawn" (without replacement) from a bowl containing 6 white and 5 black balls, what is the probability that one of the balls is white and the other two black?

6. (Ross): If n people are present in a room, what is the probability that no two of them celebrate their birthday on the same day of the year?

7. Suppose we throw n indistinguishable balls into one of the 2 distinguishable bins. What is the probability that exactly k out of n balls land in the first bin?

8. (Bertsekas and Tsitsiklis) A six-sided die is rolled three times independently. Which is more likely: a sum of 11 or a sum of 12?

9. (Bertsekas and Tsitsiklis) Ninety students, including Joe and Jane, are to be split into three classes of equal size, and this is to be done at random. What is the probability that Joe and Jane end up in the same class?

10. (Ross) How many vectors $x_1, \cdots, x_k$ are there for which each x_i is a positive integer such that $1 \leq x_i \leq n$ and $x_1 < x_2 < \cdots < x_k$?