

MA213 L3

L3: Simulation (Chapter 2.3) and probability

OpenIntro Statistics, 4th Edition

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L3: Simulation and Probability

- Previously: What we learend from last time
- This time: What we are learing today
- Deadlines/Announcements: Quiz / Exercise / Explain / after work?

Lesson Plan

- xx min Purpose of Simulation (maybe visualization)
- xx min review of *E*(*X*), *Var*(*X*) and linear combination of RV
- xx min Excercise using R (Rmd file)

Learning Objectives

- Validate and Explain Probability Distributions: Assess the validity of a probability distribution using the concepts of outcome, sample space, and probability properties (e.g., disjoint outcomes, probabilities between 0 and 1, and total probabilities summing to 1). [Q2, L3]
- Compute Probabilities Using Various Tools: Use logic, Venn diagrams, and probability rules to compute probabilities for events. [Q2, L3]
- Understand and Compute Expectations and Variances:
 Explain the concepts of expectations and variances of random variables, and compute the expectation and variance of a linear combination of random variables. [Q2, L3]

Learning Objectives Con't

- Conduct Hypothesis Testing Using Simulation: Set up null and alternative hypotheses to test for independence between variables, and use simulation techniques to evaluate data support for these hypotheses. [Q1, L3]
- Simulating E[a + bX], Var[a + bX], E[X + Y], Var[X + Y]
 (independent) learning how to simulate and the relationships between sampling and the probability distributions

Excercise using R

- Show lists of dstn functions in R
- 2. Generate random sample from different group/individual depending on the context
- 3. how to obtain E(X), Var(X) in R?
- 4. Generate sample of a + bX
- 5. Obtain E(a + bX), Var(a + bX) and compare from R and theoretical values

go over from $2, \ldots, 5$ for X + Y