STAT 134: Section 6

Adam Lucas

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Conceptual Review *(random variables, indicators)*

a. What is a random variable (r.v.)? How is this different than a distribution?

b. For r.v.s X, Y, what does $X = Y$ mean? Is this different from X and Y having the same distribution?

c. What does it mean for two r.v.s to be independent?

d. What is $\mathbb{E}(X)$? Is it a random variable? If $X = Y$, does $\mathbb{E}(X) = \mathbb{E}(Y)$?

e. If A is an event, we denote by $\mathbf{1}_A$ the indicator r.v. of A. What is the distribution of $\mathbf{1}_A$? What is $\mathbb{E}(\mathbf{1}_A)$?

Problem 1

Derive the expectation of a uniform r.v. on $\{0, 1, \ldots, n\}$.

Problem 2

Let A and B be independent events, with indicator r.v.s $\mathbf{1}_A$ and $\mathbf{1}_B$.

1. Describe the distribution of $(\mathbf{1}_A + \mathbf{1}_B)^2$ in terms of $\mathbb{P}(A)$ and $\mathbb{P}(B)$;
2. What is $\mathbb{E}\left((\mathbf{1}_A + \mathbf{1}_B)^2\right)$?