STAT131 Week 1 Notes

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1 Introduction

This document covers essential information and example problems with answers in Chapter 1 in the "Introduction to Probability, 2nd Edition" written by Joseph K. Blitzstein and Jessica Hwang.

2 Important Definitions

Contains important definitions for understanding Chapter 1 in textbook.

- *Sample Space S* is the set of all possible outcomes from the experiment

- *Event A* is the subset of *sample space* S

    - **Note:** We say an event *occurred* if the actual outcome is in A.

- *Complement* of A are the elements not in A, denoted as

$$A^c$$

- *Union* of A and B occurs if *at least one* of A or B occurs

$$A \cup B$$

- *Intersect* of A and B occurs if only and if *both* of A and B occur

$$A \cap B$$

- *De Morgan's laws* are a pair of transformation rules vital to set theory

$$(A \cup B)^c = A^c \cap B^c$$

and

$$(A \cap B)^c = A^c \cup B^c$$

3 Screenshots

English	Sets
Events and occurrences	
sample space	S
s is a possible outcome	$s \in S$
A is an event	$A \subseteq S$
A occurred	$s_{\text{actual}} \in A$
something must happen	$s_{\text{actual}} \in S$
New events from old events	
A or B (inclusive)	$A \cup B$
A and B	$A \cap B$
not A	A^c
A or B, but not both	$(A \cap B^c) \cup (A^c \cap B)$
at least one of $A_1, \ldots, A_n$	$A_1 \cup \cdots \cup A_n$
all of $A_1, \ldots, A_n$	$A_1 \cap \cdots \cap A_n$
Relationships between events	
A implies B	$A \subseteq B$
A and B are mutually exclusive	$A \cap B = \emptyset$
$A_1, \ldots, A_n$ are a partition of S	$A_1 \cup \cdots \cup A_n = S, A_i \cap A_j = \emptyset$ for $i \neq j$

1.