

# Independence of Random Events

CS 3130/ECE 3530:  
Probability and Statistics for Engineers

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# Independence



## In-Class Problem:

A fair die is thrown twice.  $A$  is the event sum of values is 5. And  $B$  is the event that at least one throw is a 2. Calculate  $P(A \mid B)$ . Are events  $A$  and  $B$  independent?



# Conditional Probability — Review

# Independence — Definitions

# Independence and Complements



## In-Class Problem:

You have two urns, one with 4 black stones and 3 white stones, the other with 2 black stones and 2 white stones. You pick one urn at random and then select a stone from the urn. Is the event that I pick urn 1 independent of the event that I pick a white stone? What if I changed the second urn to have 8 black stones and 6 white stones?



## In-Class Problem:

You have a system with a main power supply and auxiliary power supply. The main power supply has a 10% chance of failure. If the main power supply is running, the auxiliary power supply also has a 10% chance of failure. But if the main supply fails, the auxiliary supply is more likely to be overloaded and has a 15% chance to fail. Is the auxiliary supply failing independent of main supply failing?



# Independence and Compliments

# Definitions of Independence

## Brain Teaser

If I have two children, and only one is a boy born on a Tuesday, what is the probability that the other child is a boy?