All handouts for this class on Blackboard

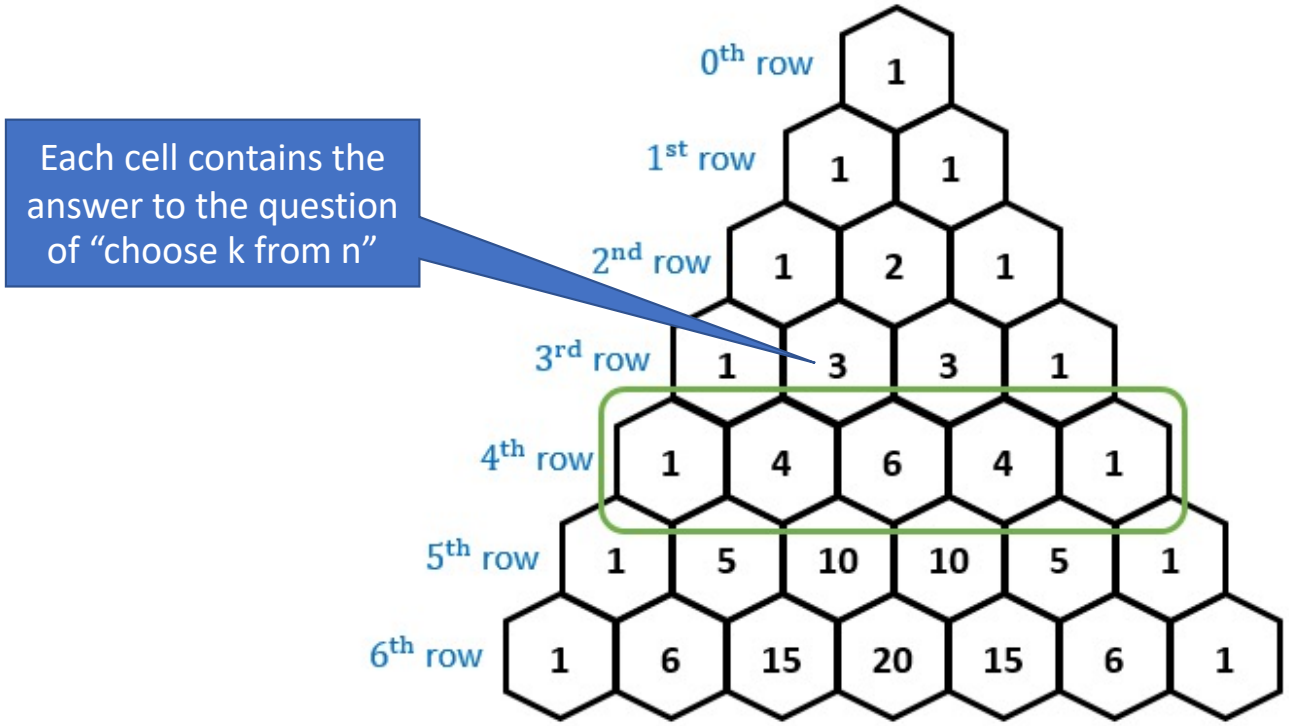
IST772
Events and Probabilities (Week 2)

Pre-class activity: Grab Week2brainTeaser.docx from Blackboard. Answer the two problems.

Binomial distribution

To model coin flips

Pascal's Triangle – Binomial Coefficients



Breakout 1 – Binomial Distribution

- Create a Pascal's triangle with R code
- Represent as probabilities
- Create some simulations of binomial trials
- Share your code on https://codeshare.io/aJDyRX

Conditional probabilities

New Information Influences Probabilities

- You have a hole in your pocket, and as you walk down the street, coins drop randomly out of your pocket and onto the street
- Tokens from the NY state thruway – long ago replaced by EZpass – are cheaply made and unbalanced
- On the other hand, the U.S. quarter is weighted to exacting standards
- If you saw that the last coin to drop had turned up tails, what is the probability that it is a quarter?

	Heads	Tails	Row Totals
Token	**3**	**1**	*4*
Quarter	**3**	**3**	*6*
Column Totals	*6*	*4*	*10*

Isolating & Normalizing a Column

	Heads	Tails	Row Totals
Token	**0.3**	**0.1**	*0.4*
Quarter	**0.3**	**0.3**	*0.6*
Column Totals	*0.6*	*0.4*	*1*

Here's the same table, converted to probabilities.

In this table we have isolated the tails column, as that was the new information presented to us.

The marginal column total for tails is used to normalize the entries in that column, which now appear in the rightmost column.

	Tails	Normalized
Token	**0.1**	*0.25*
Quarter	**0.3**	*0.75*
Column Totals	*0.4*	*1*

Breakout 2 – Conditional Probabilities

- Analyze accident data from three factories
- Use R code to enter and manipulate tabular data
- Normalize data column-wise and row-wise to take into account new information

An Information Riddle

- How many different ways are there to complete this table?
- To streamline your thinking, focus for a moment on tokens that land as tails. List the values that you could put in that cell.
- Having completed the token/tails cell with one value, what happens next?
- This scenario is your first introduction to the idea of “degrees of freedom.”

	Heads	Tails	Row Totals
Token			*4*
Quarter			*6*
Column Totals	*6*	*4*	*10*

Paper of the Week – Williams & Mazzagati, 1986

- The naming of various scientific and mathematical findings does not always reflect who actually discovered them
- A few paragraphs on the real origins of Pascal's triangle and several other well-known mathematical achievements

Mathematical Firsts—
Who Done It?

By RICHARD H. WILLIAMS, University of Miami, Coral Gables, FL 33124
ROY D. MAZZAGATTI, Miami-Dade Community College, Miami, FL 33186

Homework

- The homework for week two is based on exercises 1 and 2 on page 35, as well as problems 6, 7, and 8 on page 36 (but be sure to answer the questions in the supplied notebook).