LSU E. J. OURSO COLLEGE OF BUSINESS

Dr. Chun's Numb3rs & L∅gic

Simple Probability

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* Relative frequency

If there are *n* possible outcomes, all equally likely, and
an event *X* occurs in *k* of these outcomes,
we say that the probability of *X* is *k*/*n* and is denoted as P[X].

Ex] *A fair coin* is tossed twice and observed to be either a head or a tail each time. Let *X* be the number of heads.
Find the probability distribution of *X*.

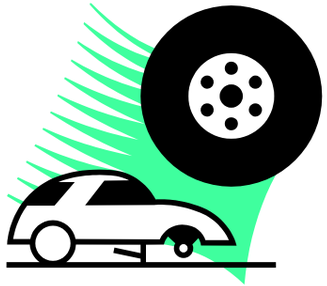
- Sample space: S = { HH, HT, TH, TT },
  where there are 4 possible outcomes
- Random variable: Let *X* be the number of heads.
- Probability distribution

X	0	1	2
P[X]	1/4	2/4	**1/4**

Flat Tire

Ask Marilyn, Parade Magazine, (March 3, 1996), p. 14

At LSU, two students had received A's in managerial statistics all semester. But on the night before the final exam, they were partying in New Orleans and didn't get back to LSU until it was over. Their excuse to the professor was that they had a flat tire, and they asked if they could take a make-up test.

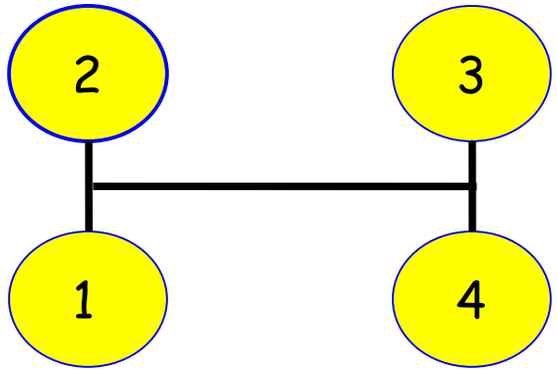


The professor agreed, wrote out a test and sent the two to separate rooms to take it. The first question (on one side of the paper) was worth 5 points, and they answered it easily. Then they flipped the paper over and found the second question, worth 95 points: "Which tire was it?"

What was the probability that both students would say the same thing? My dad and I think it's 1 in 16. Is that right?

– Heather Connell, New Freedom, Pa.

* Tires



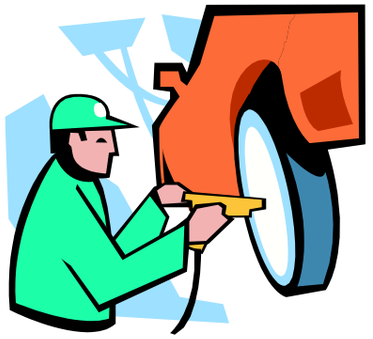
* Sample space

S = { 1 1 1 2 1 3 1 4
2 1 2 2 2 3 2 4
3 1 3 2 3 3 3 4
4 1 4 2 4 3 4 4 }

* Probability of selecting the same numbers = 4/16 = 25%

* Heard from a local mechanic!

"The most likely tire to be punctured is the **right rear one**.



That is because road debris tends to accumulate at the gutter side of the road. The front tire is usually not damaged when it runs over something like a nail, because nails normally lie flat on the pavement.

However, the front tire may kick up the nail, so that before the nail has time to fall back, it is caught by the right rear tire."

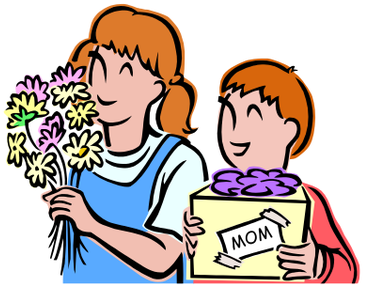
* Flat tire!

It will be the right rear tire!

Gift Exchange

From "Ask Marilyn," *Parade Magazine*, (September 13, 1992), p. 26

"After each holiday gift exchange, my five nieces and nephews write their names on slips of paper into a basket, from which they then draw the name of the person for whom they'll buy a gift the following year.



Last year, for the first time, each of the five drew his or her own name. What are the chances of such an occurrence taking place?

– Richard Coffey, Newington, Conn."

Adam	Brett	Cindy	David	Emily

* Sample space?

1 Adam	2 Brett	3 Cindy	4 David	5 Emily
1	2	3	4	5
1	2	3	5	4
1	2	4	3	5
1	2	4	5	3
..	..	..	..	..
5	4	3	1	2
5	4	3	2	1

* Number of possible permutations?

$5! = 120$

* Probability of the perfect match?

Adam	Brett	Cindy	David	Emily

$$\frac{1}{5}\ \frac{1}{4}\ \frac{1}{3}\ \frac{1}{2}\ \frac{1}{1} = 1/5! = \mathbf{1/120}$$

* Open question!

What is the probability that none of the five kids draw their own names?

* Hat-check problem

Suppose that three guests check their hats when they arrive at a restaurant, and that these hats are returned to them in a random order when they leave. Determine the probability that no guest will receive the proper hat.

Guest 1	1	1	2	2	3	3
Guest 2	2	3	1	3	1	2
Guest 3	3	2	3	1	2	1
Match?	3	1	1	0	0	1

- P[No Match] = 2/6

Ask Marilyn, Parade Magazine (May 11, 2003), page 17

"Twenty kids throw their hats into a box. They then close their eyes, and each randomly withdraws a hat. What is the probability that 19 of the kids will withdraw their own hats?"

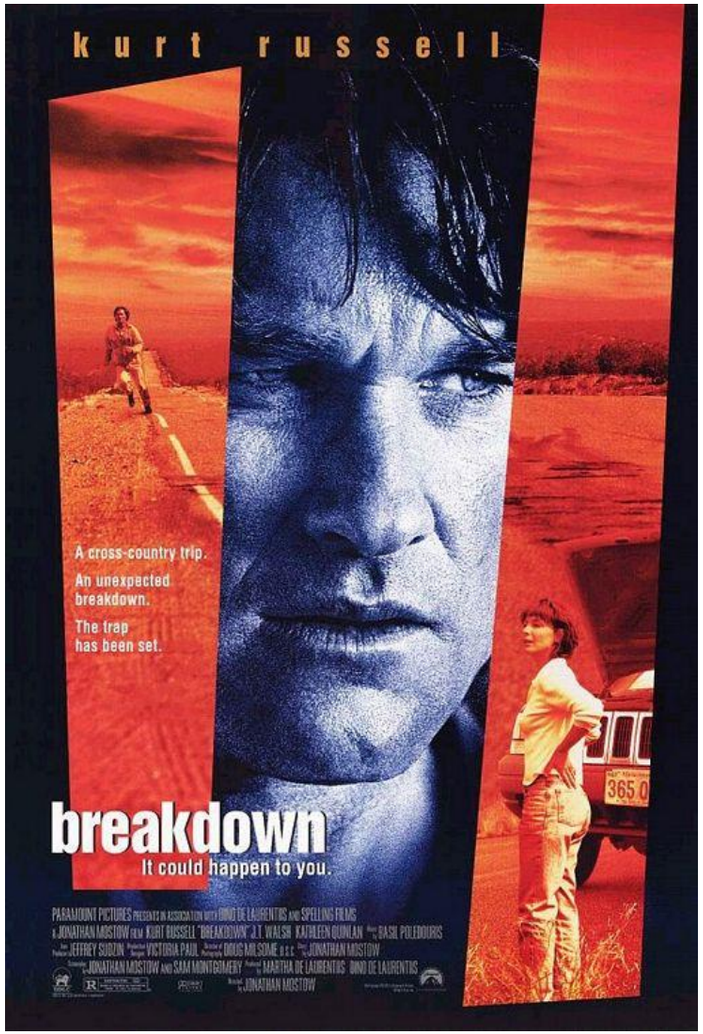
George Padgett, Greenville, S.C.

- P[X=19 matches | n=20 hats] = 0

Movie Trivia

A man searches for his missing wife
after his car breaks down in the middle of the desert.

Breakdown (1997)



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