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Buffon's Needle and Probability

Birthdays

- What is the chance that at least two people in this room have the same birthday?

n	$p(n)$
10	11.7%
20	41.1%
23	50.7%
30	70.6%
50	97.0%
57	99.0%
100	99.99997%
200	99.99999999999999999999999998%
300	$(100 - (6\times10^{-80}))\%$
350	$(100 - (3\times10^{-129}))\%$
365	$(100 - (1.45\times10^{-155}))\%$
366	100%

What is Probability?

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- Probability is a measure or estimation of how likely it is that something will happen

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$P(E) = A/N$

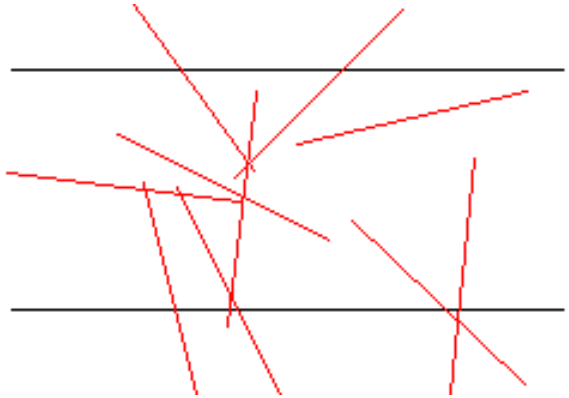
A = number of outcomes for E

N = total number of possible outcomes

- Probability is always a percentage or fraction

Buffon's Needle

- Given a surface with parallel strips, what is the probability that a randomly dropped needle will intersect one of the dividers?



Buffon's Needle

- If the needle is the same length as the width of the strips, then

$P = 2/\pi$

Buffon's Needle

- Can we use our results to estimate Pi?

$P = 2/\pi$

Buffon's Needle

- Can we use our results to estimate Pi?

$P = 2/\pi$

$\pi = 2/P$

Buffon's Needle

- What is our percent error?

$$\% \ error = |Experimental\ Value - Actual\ Value| / Actual\ Value$$

Buffon's Needle

- How could we improve the experiment?

http://mste.illinois.edu/reese/buffon/bufjava.html