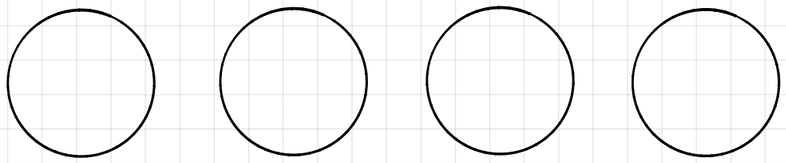
1.1 Probability Motivation (I.3 in Driver)

"Experiments"

E.g. Toss a fair coin N times.



E.g. Throw a dart at a board of radius R.

- Each experiment has an **outcome**.
- The set of all possible outcomes is the **sample space** Ω.
- "Probability" is a measure of the likelihood of a **set of outcomes** = an **event** $E \subseteq \Omega$.

Finite vs. Countable

Eg. Continue tossing a fair coin until tails comes up. What is the probability that the total number of tosses was odd?

Putative Definition

Let Ω be a sample space.

A **probability measure** on Ω is a function

$$\mathbb{P} : 2^{\Omega} \to [0,1]$$

s.t. (1) $\mathbb{P}(\Omega) = 1$

(2') If $\{E_j\}_{j=1}^{\infty}$ in 2^{Ω} are disjoint, then

$$\mathbb{P}\left(\bigsqcup_{j=1}^{\infty} E_j\right) = \sum_{j=1}^{\infty} \mathbb{P}(E_j)$$