

Flip coins until

- Let's flip coins until we get the first H , and then stop. How many flips?
- Assume that any given sequence of flips of length n has probability 2^{-n} .
 - (This is saying that the flips are "fair and independent", more on this later)
- Let F be the number of flips. But definition, $F \geq 1$... but in theory it is unbounded.
- Let us compute:
 - $\mathbb{P}(F = 1) = \mathbb{P}(\{H\}) = 1/2$;
 - $\mathbb{P}(F = 2) = \mathbb{P}(\{TH\}) = 1/4$;
 - $\mathbb{P}(F = 3) = \mathbb{P}(\{TTH\}) = 1/8$;
 - $\mathbb{P}(F = 4) = \mathbb{P}(\{TTTH\}) = 1/16$;

In general,

$$\mathbb{P}(F = n) = 2^{-n}.$$