Bernoulli random variable

$$P(X = x \mid p) = \begin{cases} p, & \text{if } x = 1 \\ 1 - p, & \text{if } x = 0 \end{cases}$$

- A random variable for modeling binary events
- Two possible outcomes:
  - Success - value 1
  - Failure - value 0

X	$P(X = x)$
0	$1 - p$
1	p

- Single parameter p, probability of a success
- multiple Bernoulli r.v. can be combined to model more complex random variables
- Shorthand notation: $X \sim \text{Bern}(p)$
- $E(X) = p,\ V(X) = p(1 - p)$

geometric random variable

- A r.v. modeling the number of (identical) Bernoulli trials needed to obtain the first success
- Infinite outcomes $\{1,2,3\ldots,\infty\}$
- Single parameter p, probability of a success for each trial
- Shorthand notation: $X \sim \text{Geo}(p)$
- $E(X) = \frac{1}{p},\ V(X) = \frac{1-p}{(p^2)}$

$$P(X = x \mid p) = p(1-p)^{x-1}$$

X	$P(X = x)$
1	p
2	$p(1-p)$
3	$p(1-p)^2$
4	$p(1-p)^3$
$\vdots$	$\vdots$
∞	$p(1-p)^{\infty} \approx 0$