

geometric random variable

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

exercise 5

exercise 6

geometric random variable

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

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

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

exercise 5

What is the probability of flipping a coin more than 4 times before getting a heads?

exercise 6

What is the expected number of rolls it will take to get a 7 when rolling two dice?

binomial random variable

- A r.v. modeling the number of successes in a fixed number of independent Bernoulli trials.

- Discrete outcomes $\{0, 1, 2, 3, \dots, n\}$

$$P(X = x | n, p) = \binom{n}{x} p^x (1 - p)^{n-x}$$

- Two parameter

- p - probability of a success for each trial
 - n - number of trials

- Shorthand notation: $X \sim \text{Binom}(n, p)$

- $E(X) = np$, $V(X) = np(1 - p)$

X	$P(X = x)$
0	$\binom{n}{0} p^0 (1 - p)^n$
1	$\binom{n}{1} p^1 (1 - p)^{n-1}$
2	$\binom{n}{2} p^2 (1 - p)^{n-2}$
\vdots	\vdots
$n-1$	$\binom{n}{n-1} p^{n-1} (1 - p)^1$
n	$\binom{n}{n} p^n (1 - p)^0$