

More Discrete Distributions

Geometric Random Variable

Notation: $X \sim \text{Geo}(p)$

Description: Number of experiments until a success. Assumes independent experiments each with probability of success p .

Parameters: $p \in [0, 1]$, the probability that a single experiment gives a "success".

Support: $x \in \{1, \dots, \infty\}$

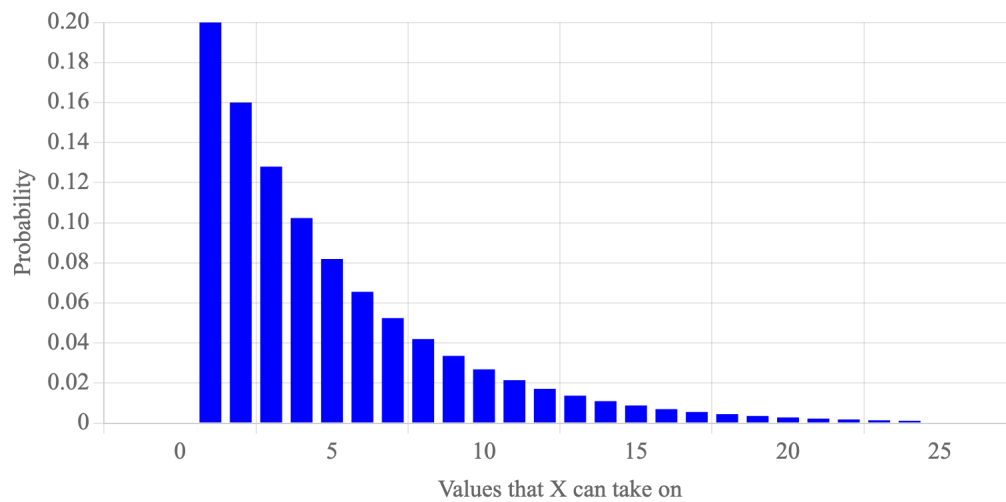
PMF equation: $P(X = x) = (1 - p)^{x-1}p$

Expectation: $E[X] = \frac{1}{p}$

Variance: $\text{Var}(X) = \frac{1-p}{p^2}$

PMF graph:

Parameter p :



Negative Binomial Random Variable

Notation: $X \sim \text{NegBin}(r, p)$

Description: Number of experiments until r successes. Assumes each experiment is independent with probability of success p .

Parameters: $r > 0$, the number of success we are waiting for.
 $p \in [0, 1]$, the probability that a single experiment gives a "success".

Support: $x \in \{r, \dots, \infty\}$

PMF equation: $P(X = x) = \binom{x-1}{r-1} p^r (1-p)^{x-r}$

Expectation: $E[X] = \frac{r}{p}$

Variance: $\text{Var}(X) = \frac{r \cdot (1-p)}{p^2}$

PMF graph:

Parameter r : 3

Parameter p : 0.20

