# The Geometric Probability Distribution

- Used for binary data (1 or 0; success or failure, etc).
- In a sequence of trials, the trial yielding the first success (all previous trials ending in failure) has a geometric distribution.
- The assumption required is that separate trials are independent and the probability of success p is the same in every trial.
- The probability of failure in each trial is $1 - p$.

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The variable X counts the number of **failures** before the first **success**. In other words, $X = 0$ if success occurs on the 1st trial. $X = 1$ means that the 1st trial ended in failure and success occurred in the 2nd trial. $X = 2$ means that the 1st and 2nd trial ended in failure and that success occurred in the 3rd trial. And so on. $Pr[X]$ is calculated as

```
# p is the probability of success
dgeom(X, prob = p)
# log of the probability instead
dgeom(X, prob = p, log=TRUE)
```

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The geometric distribution - Example R code

```
> N <- 10000
> x <- rgeom(N, .5)
> x <- rgeom(N, .01)
```