# Probability distributions: Takeaways



## Syntax

- Using the probability mass function from SciPy:

```
from scipy import linspace

from scipy.stats import binom

outcome_counts = linspace(0,30,31)

dist = binom.pmf(outcome_counts,30,0.39)
```

- Using the probability mass function from SciPy:

```
from scipy import linspace

from scipy.stats import binom

outcome_counts = linspace(0,30,31)

dist = binom.cdf(outcome_counts,30,0.39)
```

- Getting the summ of all the probabilities to the left of , including :

```
left = binom.cdf(k,N,p)
```

- Getting the sum of all the probabilities to the right of :

```
right = 1 - left
```

## Concepts

- Binomial probabilities are the chance of a certain outcome happening in a sequence.
- One way to visualize binomials is a binomial distribution. Given events, it plots the probabilities of getting different numbers of successful outcomes. The binomial distribution parameters are:
    - `N` : The total number of events.
    - `p` : The probability of the outcome we're interested in seeing.
- Formula for binomial probability:

- The probability mass function (pmf) gives us the probability of each occurring, and takes in the following parameters:
    - `x` : The list of outcomes.
    - `n` : The total number of events.
    - `p` : The probability of the outcome we're interested in seeing.
- A probability distribution can only tell us which values are likely, and how likely they are.
- We can calculate the expected probability of a probability distribution using , where is the total number of events, and is the probability of the outcome we're interested in seeing.
- The formula for standard deviation, or a measure of how much the values vary from the mean, of a probability distribution is where is the total number of events, is the probability of the outcome we're interested in seeing, and is the probability of the outcome not happening.
- The cumulative density function is the probability that or less events will occur.
- The z-score is the number if standard deviations away from the mean, and used to find the percentage of values to the left or right.
- We can calculate the mean ( ) and standard deviation ( ) using the following formulas:
    -
    -
- We can figure out the z-score of a value using the following formula:
    - z-score =

## Resources

- Probability Mass Function
- SciPy Documentation
- Documentation for scipy.stats.binom
- Cumulative Density Function