

Calculating probabilities: Takeaways

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Syntax

- Finding probability of an event:

```
days_over_threshold = bikes[bikes["cnt"] > 4000].shape[0] # number of days that satisfies condition
total_days = bikes.shape[0] # total number of days
probability_over_4000 = days_over_threshold / total_days # proportion of condition satisfied:total number of days
```

- Accessing the factorial method using the math module:

```
import math
math.factorial(5)
```

Concepts

- The probability of three heads when flipping three coins is $0.5 * 0.5 * 0.5$, which equals 0.125 .
- Probability follows a pattern. A given outcome happening all the time or none of the time, can only occur in one combination. The next step lower, a given outcome happening every time except once, or a given outcome only happening once, can happen in as many combinations as there are total events.
- A factorial means "multiply every number from 1 to this number together" so $4! = 4 * 3 * 2 * 1 = 24$.
- We can calculate the number of combinations in which an outcome can occur in a set of events using: $\frac{N!}{k!(N-k)!}$ where;
 - k is the number of times we want the desired outcome to occur.
 - N is the total number of events we have.
- The probability of a single combination occurring is given by $p^k q^{N-k}$ where:
 - p is the probability of an outcome will occur.
 - q is the complimentary probability the outcome will not happen.
 - k is the number of times we want the desired outcome to occur.
 - N is the total number of events we have.
- Statistical significance is the question of whether a result happened as the result of something we changed, or whether a result is a matter of random chance. Typically, researchers will use 5% as a significance threshold to determine if an event is statistically significant or not.

Resources

- [Binomial Distribution](#)
- [Factorial](#)
- [Statistical Significance](#)

