

# How can I find a p-value from a z-score using Python?

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The process of finding a p-value from a z-score using Python involves utilizing statistical functions and modules within the Python programming language. This includes calculating the probability under the normal distribution curve using the cumulative distribution function and the use of the `scipy.stats` module. By inputting the z-score value and specifying the desired significance level, the p-value can be calculated and interpreted to determine the level of statistical significance. This method is commonly used in hypothesis testing and other statistical analyses.

## Find a P-Value from a Z-Score in Python

Often in statistics we're interested in determining the associated with a certain z-score that results from a . If this p-value is below some significance level, we can reject the null hypothesis of our hypothesis test.

To find the p-value associated with a z-score in Python, we can use the , which uses the following syntax:

```
scipy.stats.norm.sf(abs(x))
```

where:

**x: The z-score**

The following examples illustrate how to find the p-value associated with a z-score for a left-tailed test, right-tailed test, and a two-tailed test.

**Left-tailed test**

Suppose we want to find the p-value associated with a z-score of -0.77 in a left-tailed hypothesis test.

```
import scipy.stats

#find p-value
scipy.stats.norm.sf(abs(-0.77))

0.22064994634264962
```

The p-value is 0.2206. If we use a significance level of  $\alpha = 0.05$ , we would fail to reject the null hypothesis of our hypothesis test because this p-value is not less than 0.05.

Right-tailed test

Suppose we want to find the p-value associated with a z-score of 1.87 in a right-tailed hypothesis test.

```
import scipy.stats

#find p-value
scipy.stats.norm.sf(abs(1.87))

0.030741908929465954
```

The p-value is 0.0307. If we use a significance level of  $\alpha = 0.05$ , we would reject the null hypothesis of our hypothesis test because this p-value is less than 0.05.

Two-tailed test

Suppose we want to find the p-value associated with a z-score of 1.24 in a two-tailed hypothesis test.

```
import scipy.stats
```

```
#find p-value for two-tailed test  
scipy.stats.norm.sf(abs(1.24))*2
```

```
0.21497539414917388
```

The p-value is 0.2149. If we use a significance level of  $\alpha = 0.05$ , we would fail to reject the null hypothesis of our hypothesis test because this p-value is not less than 0.05.

*You can also use this online to find p-values.*