

Modeling Time Between Leads: Updated Probabilities

Learn / Courses / Introduction to Statistics in Python

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Daily XP 569

Exercise

Modeling time between leads

To further evaluate Amir's performance, you want to know how much time it takes him to respond to a lead after he opens it. On average, he responds to 1 request every 2.5 hours. In this exercise, you'll calculate probabilities of different amounts of time passing between Amir receiving a lead and sending a response.

Instructions 2/3 55 XP

✓ Import `expon` from `scipy.stats`. What's the probability it takes Amir less than an hour to respond to a lead?

2 What's the probability it takes Amir more than 4 hours to respond to a lead?

Take Hint (-10 XP)

3 What's the probability it takes Amir 3-4 hours to respond to a lead?

script.py

Light Mode

```
1 # Import expon from scipy.stats
2 from scipy.stats import expon
3
4 # Print probability response takes > 4 hours
5 print(_____)
```

↺ Run Code Submit Answer

IPython Shell Slides

<script.py> output:
0.3296799539643487
0.20189651799465536
0.09929769391754684

In [1]:

Question:

To analyze Amir's performance, calculate the time it takes Amir to respond to leads using the Exponential distribution. On average, Amir responds to one request every 2.5 hours. Find the probabilities for different response times, including less than 1 hour, more than 4 hours, and between 3 and 4 hours.

Explanation of the Question:

The Exponential distribution models the time between events, with the scale parameter equal to the mean response time. The cumulative distribution

function (CDF) and its complement are used to compute the probabilities for specified intervals.

Answer:

```
# Import expon from scipy.stats
from scipy.stats import expon

# Define the scale parameter (mean response time = 2.5 hours)
scale = 2.5

# Probability that Amir responds in less than 1 hour
prob_less_than_1 = expon.cdf(1, scale=scale)
print(prob_less_than_1)

# Probability that Amir responds in more than 4 hours
prob_more_than_4 = 1 - expon.cdf(4, scale=scale)
print(prob_more_than_4)

# Probability that Amir responds between 3 and 4 hours
prob_between_3_and_4 = expon.cdf(4, scale=scale) - expon.cdf(3,
scale=scale)
print(prob_between_3_and_4)
```

Explanation of the Answer:

The Exponential CDF calculates the cumulative probability of responding within a certain time. The probability for less than 1 hour is computed directly using the CDF. For more than 4 hours, the complement rule ($1 - \text{CDF}$) is applied. The difference in CDF values at 4 and 3 hours gives the probability of responding between these times.