22.Scenario:

Imagine you are an analyst for a popular online shopping website. Your task is to analyze customer

reviews and provide insights on the average rating and customer satisfaction level for a specific

product category.

Question:

You will use the pandas library to calculate confidence intervals to estimate the true population

mean rating.

You have been provided with a CSV file named "customer\_reviews.csv," which contains customer

ratings for products in the chosen category.

Code:

import pandas as pd

import numpy as np

from scipy import stats

df = pd.read\_csv(r"C:\Users\jampa\Downloads\customer\_reviews (1).csv")

category = 'Electronics'

category\_data = df[df['category'] == category]

mean\_rating = category\_data['rating'].mean()

std\_dev = category\_data['rating'].std()

n = category\_data['rating'].count()

confidence\_level = 0.95

alpha = 1 - confidence\_level

t\_score = stats.t.ppf(1 - alpha/2, df=n-1)

margin\_of\_error = t\_score \* (std\_dev / np.sqrt(n))

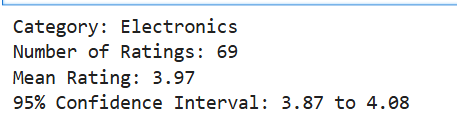
confidence\_interval = (mean\_rating - margin\_of\_error, mean\_rating + margin\_of\_error)

print(f"Category: {category}")

print(f"Number of Ratings: {n}")

print(f"Mean Rating: {mean\_rating:.2f}")

print(f"95% Confidence Interval: {confidence\_interval[0]:.2f} to {confidence\_interval[1]:.2f}")  
output:



Dataset:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| product\_id | category | rating | review |  |
| C345 | Electronics | 3.6 | Very satisfied | |
| A123 | Home | 3.9 | Loved it! |  |
| C345 | Electronics | 3.8 | Loved it! |  |
| C345 | Home | 4 | Not what I expected | |
| A123 | Home | 5.2 | Not what I expected | |
| A123 | Beauty | 3.1 | Very satisfied | |
| C345 | Home | 4.3 | Excellent quality | |
| B234 | Beauty | 3.2 | Great product! | |
| C345 | Electronics | 3.8 | Loved it! |  |
| C345 | Electronics | 4.5 | Excellent quality | |
| C345 | Electronics | 4 | Could be better | |
| C345 | Electronics | 3.5 | Loved it! |  |
| A123 | Beauty | 3.6 | Loved it! |  |
| C345 | Electronics | 4.3 | Not what I expected | |
| B234 | Home | 3.6 | Great product! | |
| A123 | Home | 4.1 | Great product! | |
| B234 | Home | 4 | Could be better | |
| B234 | Beauty | 3.7 | Could be better | |
| B234 | Electronics | 5.1 | Loved it! |  |
| B234 | Electronics | 4.3 | Very satisfied | |
| A123 | Electronics | 3 | Not what I expected | |
| A123 | Beauty | 4.1 | Not what I expected | |
| B234 | Home | 3.7 | Loved it! |  |
| B234 | Home | 4.4 | Excellent quality | |
| A123 | Electronics | 3.6 | Very satisfied | |
| A123 | Home | 3.9 | Loved it! |  |
| A123 | Home | 4.3 | Very satisfied | |
| C345 | Beauty | 4.4 | Very satisfied | |
| C345 | Beauty | 3.4 | Very satisfied | |
| C345 | Beauty | 3.8 | Loved it! |  |
| B234 | Beauty | 3.8 | Not what I expected | |
| C345 | Electronics | 3.7 | Not what I expected | |
| B234 | Beauty | 4.9 | Very satisfied | |
| B234 | Home | 4.2 | Excellent quality | |
| C345 | Electronics | 3.4 | Great product! | |
| B234 | Home | 4.5 | Loved it! |  |
| C345 | Home | 5.1 | Great product! | |
| C345 | Home | 4.5 | Excellent quality | |
| A123 | Beauty | 3.2 | Loved it! |  |
| C345 | Beauty | 3.8 | Very satisfied | |
| A123 | Electronics | 4.6 | Not what I expected | |
| C345 | Electronics | 3.6 | Great product! | |
| C345 | Beauty | 4.2 | Could be better | |
| A123 | Home | 4.4 | Could be better | |
| A123 | Electronics | 3.5 | Excellent quality | |
| C345 | Beauty | 4 | Very satisfied | |
| B234 | Beauty | 2.4 | Great product! | |
| A123 | Beauty | 3.5 | Very satisfied | |
| B234 | Home | 3.9 | Great product! | |
| B234 | Beauty | 3.4 | Excellent quality | |
| B234 | Beauty | 4.8 | Excellent quality | |
| A123 | Beauty | 3.3 | Could be better | |
| B234 | Beauty | 3.8 | Very satisfied | |
| A123 | Electronics | 4.1 | Loved it! |  |
| B234 | Electronics | 4.7 | Could be better | |
| C345 | Beauty | 3.3 | Very satisfied | |
| C345 | Home | 4.6 | Could be better | |
| A123 | Electronics | 4 | Loved it! |  |
| C345 | Beauty | 3.5 | Not what I expected | |
| C345 | Electronics | 4.2 | Not what I expected | |
| B234 | Electronics | 4.1 | Not what I expected | |
| A123 | Home | 3.7 | Not what I expected | |
| B234 | Beauty | 4 | Great product! | |
| B234 | Beauty | 3.8 | Not what I expected | |
| B234 | Home | 4.1 | Loved it! |  |
| B234 | Home | 4.3 | Excellent quality | |
| B234 | Beauty | 4.8 | Excellent quality | |
| B234 | Beauty | 3.4 | Great product! | |
| B234 | Home | 5.1 | Not what I expected | |
| A123 | Electronics | 3 | Not what I expected | |
| C345 | Electronics | 3.9 | Not what I expected | |
| B234 | Home | 4.3 | Could be better | |
| B234 | Electronics | 4.1 | Very satisfied | |
| B234 | Home | 3.7 | Could be better | |
| B234 | Electronics | 3.9 | Very satisfied | |
| B234 | Electronics | 3.8 | Not what I expected | |
| B234 | Beauty | 3.7 | Not what I expected | |
| C345 | Beauty | 4.4 | Could be better | |
| C345 | Electronics | 4.2 | Could be better | |
| B234 | Electronics | 3.7 | Very satisfied | |
| C345 | Beauty | 4.4 | Excellent quality | |
| A123 | Beauty | 4.2 | Very satisfied | |
| B234 | Beauty | 4.4 | Could be better | |
| A123 | Home | 4.3 | Loved it! |  |
| A123 | Electronics | 3.6 | Could be better | |
| B234 | Beauty | 3.7 | Loved it! |  |
| C345 | Electronics | 4.4 | Great product! | |
| A123 | Home | 4.3 | Could be better | |
| B234 | Home | 4 | Great product! | |
| A123 | Beauty | 4.1 | Excellent quality | |
| A123 | Home | 4.6 | Very satisfied | |
| A123 | Electronics | 3.7 | Loved it! |  |
| A123 | Beauty | 4.3 | Very satisfied | |
| C345 | Electronics | 3.9 | Great product! | |
| A123 | Electronics | 3.9 | Loved it! |  |
| A123 | Home | 4.5 | Very satisfied | |
| A123 | Home | 4.4 | Could be better | |
| C345 | Home | 4.4 | Not what I expected | |
| A123 | Home | 4.7 | Great product! | |
| A123 | Home | 4 | Very satisfied | |
| C345 | Beauty | 4.3 | Great product! | |
| C345 | Electronics | 3.8 | Great product! | |
| C345 | Electronics | 4.2 | Loved it! |  |
| A123 | Electronics | 3.9 | Loved it! |  |
| C345 | Electronics | 4 | Not what I expected | |
| C345 | Home | 4.3 | Could be better | |
| A123 | Electronics | 3.6 | Great product! | |
| C345 | Beauty | 5 | Very satisfied | |
| A123 | Beauty | 3.5 | Excellent quality | |
| B234 | Electronics | 3.4 | Great product! | |
| C345 | Electronics | 4.6 | Great product! | |
| B234 | Beauty | 4.4 | Not what I expected | |
| A123 | Beauty | 4.3 | Could be better | |
| C345 | Home | 4.3 | Excellent quality | |
| A123 | Beauty | 4 | Loved it! |  |
| B234 | Home | 3.6 | Loved it! |  |
| A123 | Home | 4 | Very satisfied | |
| C345 | Home | 3.7 | Excellent quality | |
| C345 | Home | 4.5 | Loved it! |  |
| B234 | Home | 3.9 | Very satisfied | |
| A123 | Electronics | 3.6 | Could be better | |
| C345 | Beauty | 3.8 | Very satisfied | |
| B234 | Home | 4.2 | Loved it! |  |
| C345 | Beauty | 3.7 | Not what I expected | |
| C345 | Beauty | 3.6 | Not what I expected | |
| A123 | Home | 4.1 | Not what I expected | |
| C345 | Electronics | 4.1 | Loved it! |  |
| A123 | Home | 3.7 | Not what I expected | |
| C345 | Electronics | 3.8 | Excellent quality | |
| B234 | Beauty | 4.1 | Could be better | |
| C345 | Electronics | 3.3 | Very satisfied | |
| A123 | Electronics | 3.3 | Very satisfied | |
| A123 | Electronics | 3.6 | Loved it! |  |
| B234 | Beauty | 3.9 | Not what I expected | |
| C345 | Beauty | 4.2 | Not what I expected | |
| C345 | Electronics | 4.7 | Great product! | |
| B234 | Electronics | 4.4 | Could be better | |
| C345 | Home | 3.9 | Excellent quality | |
| C345 | Electronics | 4 | Very satisfied | |
| A123 | Home | 3.5 | Great product! | |
| C345 | Electronics | 4 | Great product! | |
| C345 | Home | 3.9 | Loved it! |  |
| B234 | Beauty | 4.2 | Very satisfied | |
| B234 | Electronics | 3.6 | Loved it! |  |
| A123 | Electronics | 4.3 | Excellent quality | |
| C345 | Electronics | 4.8 | Great product! | |
| C345 | Electronics | 3.9 | Great product! | |
| C345 | Home | 4.2 | Could be better | |
| A123 | Electronics | 4.3 | Excellent quality | |
| A123 | Beauty | 3.8 | Great product! | |
| B234 | Beauty | 4.1 | Excellent quality | |
| A123 | Electronics | 4 | Very satisfied | |
| C345 | Beauty | 4 | Not what I expected | |
| C345 | Electronics | 3.6 | Great product! | |
| A123 | Electronics | 4 | Could be better | |
| C345 | Beauty | 4.2 | Very satisfied | |
| C345 | Electronics | 4.7 | Excellent quality | |
| A123 | Beauty | 4.5 | Loved it! |  |
| A123 | Home | 5.1 | Very satisfied | |
| C345 | Electronics | 3.6 | Great product! | |
| C345 | Home | 4.4 | Excellent quality | |
| C345 | Beauty | 4.1 | Not what I expected | |
| B234 | Home | 5.1 | Very satisfied | |
| B234 | Home | 3.6 | Great product! | |
| B234 | Beauty | 3.6 | Could be better | |
| A123 | Home | 3.7 | Loved it! |  |
| B234 | Home | 2.9 | Excellent quality | |
| A123 | Beauty | 3.7 | Very satisfied | |
| A123 | Home | 3.6 | Very satisfied | |
| B234 | Beauty | 4.1 | Not what I expected | |
| B234 | Home | 4.2 | Not what I expected | |
| B234 | Beauty | 4.9 | Could be better | |
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