23.Scenario:

You are a researcher working in a medical lab, investigating the effectiveness of a new treatment

for a specific disease. You have collected data from a clinical trial with two groups: a control group

receiving a placebo, and a treatment group receiving the new drug.Your goal is to analyze the data

using hypothesis testing and calculate the p-value to determine if the new treatment has a

statistically significant effect compared to the placebo. You will use the matplotlib library to

visualize the data and the p-value.  
code:

import pandas as pd

import scipy.stats as stats

import matplotlib.pyplot as plt

import seaborn as sns

# Load the dataset

df = pd.read\_csv(r"C:\Users\jampa\Downloads\clinical\_trial\_data.csv")

# Separate data into control and treatment groups

control = df[df['group'] == 'control']['recovery\_time']

treatment = df[df['group'] == 'treatment']['recovery\_time']

# Perform an independent t-test

t\_stat, p\_value = stats.ttest\_ind(control, treatment)

# Print hypothesis testing results

print("T-statistic:", t\_stat)

print("P-value:", p\_value)

# Interpret the result

alpha = 0.05

if p\_value < alpha:

print("Result: Statistically significant difference (reject H0)")

else:

print("Result: Not statistically significant (fail to reject H0)")

# Visualization (Future-proofed for Seaborn v0.14.0+)

plt.figure(figsize=(10, 6))

sns.boxplot(x='group', y='recovery\_time', hue='group', data=df, palette='Set2', legend=False)

plt.title('Recovery Time by Group')

plt.xlabel('Group')

plt.ylabel('Recovery Time (days)')

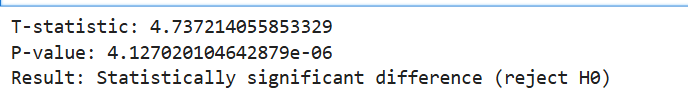
plt.text(0.5, max(df['recovery\_time']) - 1, f'P-value: {p\_value:.4f}',

ha='center', fontsize=12, color='red')

plt.tight\_layout()

plt.show()

output:



A graph with a bar chart

AI-generated content may be incorrect.

Dataset:

|  |  |
| --- | --- |
| group | recovery\_time |
| control | 10.99343 |
| control | 9.723471 |
| control | 11.29538 |
| control | 13.04606 |
| control | 9.531693 |
| control | 9.531726 |
| control | 13.15843 |
| control | 11.53487 |
| control | 9.061051 |
| control | 11.08512 |
| control | 9.073165 |
| control | 9.06854 |
| control | 10.48392 |
| control | 6.17344 |
| control | 6.550164 |
| control | 8.875425 |
| control | 7.974338 |
| control | 10.62849 |
| control | 8.183952 |
| control | 7.175393 |
| control | 12.9313 |
| control | 9.548447 |
| control | 10.13506 |
| control | 7.150504 |
| control | 8.911235 |
| control | 10.22185 |
| control | 7.698013 |
| control | 10.7514 |
| control | 8.798723 |
| control | 9.416613 |
| control | 8.796587 |
| control | 13.70456 |
| control | 9.973006 |
| control | 7.884578 |
| control | 11.64509 |
| control | 7.558313 |
| control | 10.41773 |
| control | 6.08066 |
| control | 7.343628 |
| control | 10.39372 |
| control | 11.47693 |
| control | 10.34274 |
| control | 9.768703 |
| control | 9.397793 |
| control | 7.042956 |
| control | 8.560312 |
| control | 9.078722 |
| control | 12.11424 |
| control | 10.68724 |
| control | 6.47392 |
| control | 10.64817 |
| control | 9.229835 |
| control | 8.646156 |
| control | 11.22335 |
| control | 12.062 |
| control | 11.86256 |
| control | 8.321565 |
| control | 9.381575 |
| control | 10.66253 |
| control | 11.95109 |
| control | 9.041652 |
| control | 9.628682 |
| control | 7.78733 |
| control | 7.607587 |
| control | 11.62505 |
| control | 12.71248 |
| control | 9.85598 |
| control | 12.00707 |
| control | 10.72327 |
| control | 8.70976 |
| control | 10.72279 |
| control | 13.07607 |
| control | 9.928348 |
| control | 13.12929 |
| control | 4.76051 |
| control | 11.64381 |
| control | 10.17409 |
| control | 9.401985 |
| control | 10.18352 |
| control | 6.024862 |
| control | 9.560656 |
| control | 10.71423 |
| control | 12.95579 |
| control | 8.96346 |
| control | 8.383013 |
| control | 8.996486 |
| control | 11.8308 |
| control | 10.6575 |
| control | 8.94048 |
| control | 11.02653 |
| control | 10.19416 |
| control | 11.93729 |
| control | 8.595894 |
| control | 9.344676 |
| control | 9.215784 |
| control | 7.07297 |
| control | 10.59224 |
| control | 10.52211 |
| control | 10.01023 |
| control | 9.530826 |
| treatment | 5.669259 |
| treatment | 7.658709 |
| treatment | 7.814571 |
| treatment | 6.895445 |
| treatment | 8.177429 |
| treatment | 9.308102 |
| treatment | 12.27237 |
| treatment | 8.849156 |
| treatment | 9.015101 |
| treatment | 8.351108 |
| treatment | 4.662458 |
| treatment | 8.446972 |
| treatment | 8.62046 |
| treatment | 13.42648 |
| treatment | 8.115278 |
| treatment | 9.103095 |
| treatment | 8.430576 |
| treatment | 6.162644 |
| treatment | 10.78565 |
| treatment | 10.00387 |
| treatment | 10.08206 |
| treatment | 6.681225 |
| treatment | 11.30559 |
| treatment | 5.696298 |
| treatment | 9.673714 |
| treatment | 12.88091 |
| treatment | 6.518927 |
| treatment | 7.367405 |
| treatment | 8.699303 |
| treatment | 7.493049 |
| treatment | 5.398673 |
| treatment | 8.637126 |
| treatment | 6.375393 |
| treatment | 9.447185 |
| treatment | 6.661152 |
| treatment | 11.59987 |
| treatment | 6.933493 |
| treatment | 7.855877 |
| treatment | 10.12703 |
| treatment | 6.038271 |
| treatment | 8.95492 |
| treatment | 11.11429 |
| treatment | 5.285034 |
| treatment | 8.869268 |
| treatment | 9.019766 |
| treatment | 10.06365 |
| treatment | 6.026099 |
| treatment | 5.859087 |
| treatment | 9.543883 |
| treatment | 9.093969 |
| treatment | 9.000986 |
| treatment | 9.192896 |
| treatment | 7.139951 |
| treatment | 8.964507 |
| treatment | 9.086145 |
| treatment | 7.071297 |
| treatment | 12.23155 |
| treatment | 9.447666 |
| treatment | 6.117393 |
| treatment | 9.813107 |
| treatment | 6.550637 |
| treatment | 10.07417 |
| treatment | 10.81719 |
| treatment | 6.858635 |
| treatment | 10.42675 |
| treatment | 9.325562 |
| treatment | 10.14412 |
| treatment | 12.29359 |
| treatment | 8.009224 |
| treatment | 6.992528 |
| treatment | 6.720971 |
| treatment | 6.868379 |
| treatment | 8.345797 |
| treatment | 9.182304 |
| treatment | 9.053382 |
| treatment | 10.15437 |
| treatment | 8.526004 |
| treatment | 11.40707 |
| treatment | 7.970686 |
| treatment | 13.94034 |
| treatment | 9.751335 |
| treatment | 6.785685 |
| treatment | 6.358215 |
| treatment | 9.464945 |
| treatment | 8.053074 |
| treatment | 9.928001 |
| treatment | 9.446475 |
| treatment | 8.354342 |
| treatment | 6.806413 |
| treatment | 5.470306 |
| treatment | 7.60697 |
| treatment | 10.2128 |
| treatment | 8.928187 |
| treatment | 6.008522 |