untitled3

November 21, 2024

[1]:
```
from scipy.stats import ttest_1samp

# Data
masses = [8.8, 6.6, 9.5, 11.2, 10.2, 7.4, 8.0, 9.6, 9.9, 9.0, 7.6, 7.4, 10.4,␣
 ↪11.1, 8.5, 10.0, 11.6, 10.7, 10.3, 7.0]
population_mean = 10  # Null hypothesis mean
alpha = 0.05  # Significance level

# Perform one-sample t-test
t_stat, p_value = ttest_1samp(masses, population_mean)

print(f"T-statistic: {t_stat:.4f}, p-value: {p_value:.4f}")
if p_value < alpha:
    print("Reject the null hypothesis: The average mass is significantly␣
 ↪different from 10 g.")
else:
    print("Fail to reject the null hypothesis: No significant difference from␣
 ↪10 g.")
```

```
T-statistic: -2.2492, p-value: 0.0366
Reject the null hypothesis: The average mass is significantly different from 10
g.
```

[2]:
```
from scipy.stats import ttest_ind

# Data
sample_upwind = [10.8, 10.0, 8.2, 9.9, 11.6, 10.1, 11.3, 10.3, 10.7, 9.7, 7.5,␣
 ↪9.6, 9.7, 11.6, 10.3, 9.8, 12.3, 11.0, 10.4, 10.4]
sample_downwind = [7.8, 7.5, 9.5, 11.7, 8.1, 8.8, 8.8, 7.7, 9.7, 7.0, 9.0, 9.7,␣
 ↪11.3, 8.7, 8.8, 10.9, 10.1, 9.6, 8.4, 6.6, 7.2, 7.6, 11.5, 6.6, 8.6, 10.5, 8.
 ↪4, 8.5, 10.2, 9.2]
alpha = 0.05  # Significance level

# Perform two-sample t-test
t_stat, p_value = ttest_ind(sample_upwind, sample_downwind, equal_var=True)

print(f"T-statistic: {t_stat:.4f}, p-value: {p_value:.4f}")
```

```
if p_value < alpha:
    print("Reject the null hypothesis: The masses are significantly different.")
else:
    print("Fail to reject the null hypothesis: No significant difference in␣
 ↪masses.")
```

```
T-statistic: 3.5520, p-value: 0.0009
Reject the null hypothesis: The masses are significantly different.
```

[3]:
```
from scipy.stats import f_oneway

# Data
marks_section_a = [51, 45, 33, 45, 67]
marks_section_b = [23, 43, 23, 43, 45]
marks_section_c = [56, 76, 74, 87, 56]
alpha = 0.05  # Significance level

# Perform ANOVA test
f_stat, p_value = f_oneway(marks_section_a, marks_section_b, marks_section_c)

print(f"F-statistic: {f_stat:.4f}, p-value: {p_value:.4f}")
if p_value < alpha:
    print("Reject the null hypothesis: The mean marks are significantly␣
 ↪different among the sections.")
else:
    print("Fail to reject the null hypothesis: No significant difference in␣
 ↪mean marks among the sections.")
```

```
F-statistic: 9.7472, p-value: 0.0031
Reject the null hypothesis: The mean marks are significantly different among the
sections.
```