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| ✏️ Generate | print hello world using rot13 | 🔍 | Close |

```python
import numpy as np
import scipy.stats as stats
# Set a random seed for reproducibility
np.random.seed(42)
# Generate hypothetical growth data for three treatments (A, B, C)
n_plants = 25
growth_A = np.random.normal(loc=10, scale=2, size=n_plants)
growth_B = np.random.normal(loc=12, scale=3, size=n_plants)
growth_C = np.random.normal(loc=15, scale=2.5, size=n_plants)
# Combine all data into one array
all_data = np.concatenate([growth_A, growth_B, growth_C])
# Treatment labels for each group
treatment_labels = ['A'] * n_plants + ['B'] * n_plants + ['C'] * n_plants
# Perform one-way ANOVA
f_statistic, p_value = stats.f_oneway(growth_A, growth_B, growth_C)
# Print results
print("Treatment A Mean Growth:", np.mean(growth_A))
print("Treatment B Mean Growth:", np.mean(growth_B))
print("Treatment C Mean Growth:", np.mean(growth_C))
print()
print(f"F-Statistic: {f_statistic:.4f}")
print(f"P-Value: {p_value:.4f}")
# Decision based on the significance level
alpha = 0.05
if p_value < alpha:
  print("Reject the null hypothesis: There is a significant difference in mean growth rates among the three treatments.")
else:
  print("Fail to reject the null hypothesis: There is no significant difference in mean growth rates among the three treatments.")
# Additional: Post-hoc analysis (Tukey's HSD) if ANOVA is significant
if p_value < alpha:
  from statsmodels.stats.multicomp import pairwise_tukeyhsd
  tukey_results = pairwise_tukeyhsd(all_data, treatment_labels,
alpha=0.05)
print("\nTukey's HSD Post-hoc Test:")
print(tukey_results)
```

```
Treatment A Mean Growth: 9.672983882683818
Treatment B Mean Growth: 11.137680744437432
```

```
Treatment C Mean Growth: 15.265234904828972

F-Statistic: 36.1214
P-Value: 0.0000
Reject the null hypothesis: There is a significant difference in mean growth rates among the three treatments.

Tukey's HSD Post-hoc Test:
Multiple Comparison of Means - Tukey HSD, FWER=0.05
===================================================
group1 group2 meandiff p-adj   lower   upper  reject
---------------------------------------------------
     A      B   1.4647 0.0877 -0.1683 3.0977  False
     A      C   5.5923    0.0  3.9593 7.2252   True
     B      C   4.1276    0.0  2.4946 5.7605   True
---------------------------------------------------
```

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