### Quiz: Advanced Statistics

1. Which of the following is NOT an assumption to use ANOVA?

- A) Homogeneity of variance

- B) Independence of observations

- C) Normality of residuals

- D) Equidistant data points

2. Which type of ANOVA is appropriate when there is only one factor being tested?

- A) One-Way ANOVA

- B) Two-Way ANOVA

- C) Three-Way ANOVA

- D) Factorial ANOVA

3. Which term in the ANOVA table represents the amount of variation due to differences between groups?

- A) Within Groups

- B) Total

- C) Between Groups

- D) Error

4. Which Python library can be used to perform ANOVA?

- A) NumPy

- B) Pandas

- C) SciPy

- D) Matplotlib

5. What percentage of the total variation in the response variable is explained by the differences between groups in ANOVA?

- A) Between Groups Variance / Total Variance

- B) Within Groups Variance / Total Variance

- C) Between Groups Variance / (Between Groups Variance + Within Groups Variance)

- D) Within Groups Variance / (Between Groups Variance + Within Groups Variance)

6. In a One-Way ANOVA with 4 groups, what degrees of freedom are associated with the Within Groups sum of squares?

- A) 1

- B) 2

- C) 3

- D) 4

7. In Python, which function from the scipy library is used to perform One-Way ANOVA calculations?

- A) scipy.stats.ttest\_ind

- B) scipy.stats.f\_oneway

- C) scipy.stats.chisquare

- D) scipy.stats.mannwhitneyu

### Answers

1. \*\*D) Equidistant data points\*\*

- ANOVA assumes homogeneity of variance, independence of observations, and normality of residuals, but not equidistant data points.

2. \*\*A) One-Way ANOVA\*\*

- One-Way ANOVA is used when there is only one factor being tested.

3. \*\*C) Between Groups\*\*

- The "Between Groups" term represents the variation due to differences between groups.

4. \*\*C) SciPy\*\*

- SciPy is a Python library that can be used to perform ANOVA, specifically using the `scipy.stats.f\_oneway` function.

5. \*\*A) Between Groups Variance / Total Variance\*\*

- This ratio gives the percentage of total variation explained by the differences between groups.

6. \*\*C) 3\*\*

- For Within Groups sum of squares, the degrees of freedom is the total number of observations minus the number of groups (N - k), which in this case is N - 4.

7. \*\*B) scipy.stats.f\_oneway\*\*

- The `scipy.stats.f\_oneway` function is used to perform One-Way ANOVA calculations in Python.