(Start Here) Analysis Type — Number of Dependent Variables — Type of Dependent Variable(s) — (If Categorical DV) Number of Categories — Number of Independent Variables — Type of Independent Variable(s) — (If Categorical IV) Number of Categories — (If Categorical IV) Research Design — **Recommended Analysis** — **Non-Parametric Alternative**

Hypothesis Test

- One
  - Nominal
    - Two
      - None (Test Value) → Binomial Test
      - One
        - Nominal
          - Two
            - Between-Subjects → Fisher's Exact Test
            - Within-Subjects → McNemar's Test
          - Two or more → Chi-Squared Test / Likelihood Ratio Test[1]
        - Ordinal → Rank-Biserial Correlation / Kendall's τ / Spearman's ρ
        - Continuous → Logistic Regression / Point-biserial Correlation
      - Two or more
        - Continuous → Discriminant Analysis
        - Categorical → Loglinear Analysis
        - Any → Logistic Regression
    - More than two
      - None (Distribution) → Multinomial Test
      - One
        - Categorical → Chi-Squared Test / Likelihood Ratio Test[1]
        - Any → Multinomial Logistic Regression
      - Two or more
        - Continuous → Discriminant Analysis
        - Categorical → Loglinear Analysis
        - Any → Multinomial Logistic Regression
  - Ordinal
    - One
      - Nominal
        - Two → Rank-Biserial Correlation / Kendall's τ / Spearman's ρ
      - Ordinal → Kendall's τ / Spearman's ρ
      - Continuous → Ordinal Logistic Regression / Biserial Correlation
    - Two or more → Ordinal Logistic Regression
  - Continuous
    - None (Test Value) → One Sample t-Test (Wilcoxon signed-rank Test) / Z-Test[2]
    - One
      - Categorical
        - Two
          - Between-Subjects → Independent Samples t-Test (Mann-Whitney U-Test[3]) / Welch's t-Test / Point-biserial Correlation
          - Within-Subjects → Paired Samples t-Test (Wilcoxon signed-rank Test)
        - More Than Two
          - Between-Subjects → One-Way ANOVA (Kruskal-Wallis Test)
          - Within-Subjects → One-Way Repeated Measures ANOVA (Friedman Test)
      - Continuous → Pearson Correlation (Kendall's τ / Spearman's ρ) / Linear Regression (Nonparametric Regression)
    - Two or more
      - Categorical
        - Between-Subjects → Multi-Way ANOVA (Kruskal-Wallis Test[4])
        - Within-Subjects → Factorial Repeated Measures ANOVA
        - Mixed → Factorial Mixed ANOVA
      - Continuous → Multiple Linear Regression (Nonparametric Regression) / Partial Correlation
      - Both → Multiple Linear Regression (Nonparametric Regression) / ANCOVA (Quade's ANCOVA)
- Two or more
  - Continuous
    - One
      - Categorical → MANOVA (Nonparametric MANOVA)
      - Continuous → Cannonical Correlation Analysis
    - Two or more
      - Continuous → Cannonical Correlation Analysis
      - Categorical → Factorial MANOVA
      - Both → MANCOVA

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[1] Two analyses that are closely related (and can be seen as approximations) to the likelihood ratio test are the Wald test and the score test.

[2] When the aim is to test whether a population mean is equal to a given test value, use the (one sample) t-test when the true population variance is *not* known and the Z-test when it is known.

[3] The Mann-Whitney U-test is also sometimes referred to as the Wilcoxon rank-sum test.

[4] Note that the Kruskal-Wallis test can only test main effects (i.e., no interaction effects).

Note 1. This sheet does obviously not cover every single statistical hypothesis test. For conciseness, I purposefully left out infrequently used methods such as polynomial regression or multinomial probit regression. The sheet does currently also not consider mixed or random effect models and excludes predictive analyses that are typically not used for hypothesis testing (e.g., tree-based machine learning methods). Those types of models might be added later. However, if you have some constructive feedback on this sheet, please feel free to reach out: drawstim@gmail.com.

Note 2. All of the statistical tests mentioned on this sheet are usually conducted as classical (frequentist) hypothesis tests, which should be possible using any statistical software. However, most of them also have a Bayesian version that can be performed using R or JASP.

Variable types. In some cases, the variable type *categorical* is split up in *nominal* and *ordinal*.