Stats Notes

Status	In progress
Course	Stats

https://github.com/AdrianBasukii/stats-notes-bimay

Gam: https://drive.google.com/file/d/1lR_AxxR7r142UYkt56W_OFjvAnyrXS9q/view

https://github.com/L1M1N4L/StatsFinalNotes

https://github.com/RyanPK528/stats

Forums and Presentation Slides

https://www.thebricks.com/resources/how-to-do-anova-in-google-sheets

Link to do ANOVA in sheets

https://youtu.be/XtZ6-eFWNko?si=tphEZZ6Xc7qtzf1o

Google Sheet testing

https://docs.google.com/spreadsheets/d/1fkb0bCty48Gt6AspEP_O6mFfze7xpgcL8j4EMQ7FhDw/edit?usp=sharing

Exercise Explanations

Calculation Practices

Online Calculators That Can Help:

- **Basic Arithmetic Calculators:**
  - Good for basic operations like addition, subtraction, multiplication, division, square roots, and powers.
  - **Where to find it:** Most operating systems have a built in calculator application. Google Calculator, or many other online websites.
  - **Review:** While very basic, it's important to be comfortable with arithmetic especially with decimals.
- **Statistical Calculators:** These calculators help with more complex statistical computations:
  - **Mean, Median, Mode Calculator:** For calculating the mean (average), median (middle value), and mode (most frequent value) of a dataset.
    - **Where to find it:** Search for "mean median mode calculator" online (e.g., Calculator Soup, Easy Calculation).
    - **Review:** You need to understand which measure is appropriate given the data.
  - **Standard Deviation Calculator:** Finds the standard deviation of a dataset, a measure of data dispersion.
    - **Where to find it:** Search for "standard deviation calculator" online (e.g., Calculator Soup).
    - **Review:** It's important to know the mean and variance to use this calculation.
  - **Trimean Calculator:** Averages the mean and median to provide a trimmed average.
    - **Where to find it:** Search for "trimean calculator" online.

    - **Review:** It's useful to reduce the influence of the outliers.
- **Geometric Mean Calculator:** Use for finding the average growth rate over time.
    - **Where to find it:** Search for "geometric mean calculator" online (e.g., Calculator Soup, Miniwebtool).
    - **Review:** Useful for rates/ratios over time (e.g., growth, returns).
- **Percentile Calculator:** Helps you determine values like quartiles (Q1, Q3), which divide the data into quarters.
    - **Where to find it:** Search for "percentile calculator" online.
    - **Review:** Used in box plots and for understanding the spread of your data.
- **Stem-and-Leaf Plot Generator:** Helps you to present your data.
    - **Where to find it:** Search for "stem and leaf calculator" online.
    - **Review:** It's useful for visual representation and seeing distribution.
- **Box Plot Generator:** Creates box plots using your five-number summaries. *

  Where to find it: Search for "box plot calculator" online (e.g., Meta-Calculator, Math is Fun).
    - **Review:** Learn about how to analyze the distribution of the data, find median and understand outliers.
- **T-Test Calculator (One Sample):** For conducting t-tests to compare a sample mean to a population mean.
    - **Where to find it:** Search for "one sample t-test calculator" online (e.g., GraphPad, Social Science Statistics).
    - **Review:** It's critical to review how to use this for hypothesis testing.
- **T-Test Calculator (Paired Samples):** For conducting t-tests to compare the means of two related samples (e.g. before and after).
    - **Where to find it:** Search for "paired t-test calculator" online (e.g., GraphPad, Social Science Statistics).

        - **Review:** Understand the paired t-test hypothesis testing framework.
    - **T-Test Calculator (Independent Samples):** For conducting t-tests to compare the means of two independent samples.
        - **Where to find it:** Search for "independent t-test calculator" online (e.g., GraphPad, Social Science Statistics).
        - **Review:** Know when to use this versus other T-test.
    - **ANOVA Calculator:** For performing one-way and two-way ANOVAs, used to compare means of three or more groups.
    - **Where to find it:** Search for "one way anova calculator" or "two way anova calculator" online (e.g., Social Science Statistics).
      *

      Review: Learn about the F-statistic, p-value and hypothesis testing framework.
    - **Chi-Square Calculator:** Used for testing the independence of categorical variables.
        - **Where to find it:** Search for "chi-square test calculator" online (e.g., Social Science Statistics, Calculator Soup).
        - **Review:** Know how to calculate degrees of freedom and interpret the chi-square statistic.
- **Probability Calculators:**
    - **Permutation and Combination Calculators:** For calculating permutations and combinations, used in counting problems.
        - **Where to find it:** Search for "permutation calculator" or "combination calculator" online (e.g., Calculator Soup, Easy Calculation).
        - **Review:** Understand when to use permutation vs. combination based on whether the order of the events matters.
    - **Hypergeometric Calculator:** For calculating probabilities when sampling without replacement.
        - **Where to find it:** Search for "hypergeometric calculator" online.
        - **Review:** Understand the properties of sampling without replacement.

    - **Binomial Distribution Calculator:** Useful for experiments with fixed number of trials where outcome is binary (success/failure).
        - **Where to find it:** Search for "binomial distribution calculator" online.
        - **Review:** Useful for probability calculations in situations with binary outcomes.
    - **Z-score Calculator:** To calculate and convert a data point to a Z-score, needed in normal distribution analysis.
        - **Where to find it:** Search for "z-score calculator" online.
        - **Review:** Know when to use this score to make conclusions based on the standard normal distribution.
- **Correlation Calculator:** For finding the Pearson correlation coefficient, measuring the strength and direction of linear relationships.
    - **Where to find it:** Search for "correlation calculator" or "Pearson correlation calculator" online.
    - **Review:** Understand the range of the correlation values and know how to describe the strength of the linear relationship.

Key Statistical Concepts to Learn More About:

- **Descriptive Statistics:**
    - **Measures of Central Tendency:** Mean, median, and mode. When to use each.
    - **Measures of Dispersion:** Range, variance, standard deviation.
    - **Percentiles:** Understand what different percentiles represent.
    - **Five Number Summary:** Min, Q1, Median, Q3, Max. How it relates to data distributions.
    - **Trimmed Mean:** What are its benefits in reducing outliers influence?
    - **Geometric Mean:** When to use vs arithmetic mean.
    - **Stem-and-Leaf Plot and Box Plot:** Use to visualize data, find central tendency and outliers.

- **Inferential Statistics:**
  - **Hypothesis Testing:** Null and alternative hypothesis, test statistics, critical values, p-values, significance levels, and when to reject/fail to reject.
  - **T-Tests:** One-sample, paired, and independent. Know when to apply each.
  - **ANOVA:** Understanding when to apply one-way or two-way ANOVA.
  - **Chi-Square Test of Independence:** Determine if there is an association of two categorical variables.
    - Formula = getting the observed value and expected value
- **Probability:**
  - **Permutations and Combinations:** How to use them in counting problems.
  - **Hypergeometric Distribution:** Sampling without replacement.
  - **Binomial Distribution:** Fixed number of trials with binary outcomes.
  - **Z-score and Normal Distribution:** How z-scores help us interpret probabilities.
  - **Independent Events:** What are independent events and how do we find the probability of those events happening.
- **Correlation:**
  - **Pearson Correlation Coefficient (r):** Interpret its value for the strength and direction of linear relationship.

Key Takeaways for Exam Preparation:

- **Understand When to Apply Each Technique:** Knowing which statistical test to use in different scenarios is very important.
- **Data Interpretation:** You should be able to explain the meaning of the calculated values, test statistics, and p-values in the context of the problem.
- **Assumptions:** Be aware of the assumptions underlying each test (e.g., normality, independence).
- **Practice, Practice, Practice:** Use the online calculators to check your work, but make sure you are able to do the calculations manually as well.

I recommend focusing on these topics and using the calculators to verify your understanding. Let me know if you have any more questions!