

Project Milestone 3: Statistical Analysis

I306 Statistics for Informatics

Overview

This milestone applies the inferential techniques we've learned to your dataset. You will conduct hypothesis tests and construct confidence intervals to draw conclusions about your data.

Due: End of Week 12 **Points:** 40

Requirements

Your analysis must include:

1. At least one hypothesis test
2. At least one confidence interval
3. Discussion of assumptions and their validity

Deliverables

Submit a Quarto document (.qmd) and its rendered PDF containing:

1. Research Questions (5 points)

State 1-2 specific research questions you will address. These should be questions that can be answered with the statistical methods we've covered:

- Comparing means (t-tests, ANOVA)
- Comparing proportions (chi-square tests)
- Testing associations

2. Hypothesis Test (15 points)

For your hypothesis test:

- State the null and alternative hypotheses clearly
- Identify the appropriate test (justify your choice)
- Check and discuss assumptions
- Report the test statistic and p-value

- State your conclusion in context

3. Confidence Interval (10 points)

Construct and interpret a confidence interval for a population parameter:

- Identify the parameter of interest
- Report the interval with appropriate confidence level
- Interpret the interval in context
- Connect the CI to your hypothesis test (if applicable)

4. Assumptions (10 points)

For each analysis:

- List the assumptions required
- Assess whether each assumption is met (use visualizations if helpful)
- Discuss how violations might affect your conclusions
- Discuss your conclusions in practical or substantive (what things meant) terms

Suggested Analyses by Data Type

| Question Type | Recommended Test |
|---|-----------------------|
| Compare two group means | Two-sample t-test |
| Compare 3+ group means | One-way ANOVA |
| Association between categorical variables | Chi-square test |
| Single proportion vs. known value | One-proportion z-test |
| Two proportions | Two-proportion z-test |

Submission

Submit your `.qmd` source file and rendered output (PDF or HTML) to Canvas by the due date.

Grading Rubric

| Component | Points | Criteria |
|---------------------|--------|--|
| Research Questions | 5 | Clear, specific, testable |
| Hypothesis Test | 15 | Correct test, proper execution, valid interpretation |
| Confidence Interval | 10 | Correct construction and interpretation |

| Component | Points | Criteria |
|-------------|--------|-----------------------------------|
| Assumptions | 10 | Thorough assessment with evidence |

Tips

- Choose analyses that answer genuinely interesting questions about your data
- If assumptions are violated, discuss the implications honestly
- Connect your statistical findings back to the visualizations from Milestone 2
- Remember: statistical significance is not the same as practical significance