SURV 616/686
Homework Assignment #02
75 points

Here's a review and breakdown of the key elements to include in your assignment submission:

1. Detailed Calculations:

Ensure that you show **every step** of your calculations. Breaking down complex problems into smaller, manageable steps not only helps in accuracy but also makes it easier for graders to follow your thought process. Homework submissions that do not include detailed calculations will be penalized by 5 points. For each question requiring calculations, present your work as follows:

> **Example Calculation Steps:**
> 1. State the formula or principle being applied. (You can use a citation where applicable)
> 2. Substitute the known values into the formula.
> 3. Show the intermediate steps clearly.
> 4. Arrive at the final answer, with correct units.

2. Submission of Code and Output:

If your assignment involves writing code, make sure you provide:
- The code itself.
- A description or comments within the code to explain the purpose of different sections.
- The output generated by the code.
- Any assumptions made or special conditions handled within the code.

We request that you avoid using specialized functions from R unless explicitly instructed otherwise. Instead, focus on applying the calculation steps discussed in the class notes and videos. The goal of this class is to help you understand the underlying principles, not just to find functions or packages that provide quick answers.

Example Code Submission Format:

```
# Example R Code
     calculate_area <- function(radius) {
        # Function to calculate the area of a circle given its radius.
        area <- pi * (radius ^ 2)
        return(area)
     }

# Test the function and print the output
     radius <- 5
     area <- calculate_area(radius)
     cat("The area of the circle with radius", radius, "is", area, "\n")
```

Output:

The area of the circle with radius 5 is 78.53981633974483

Homework submissions that do not include code with descriptions and comments will be penalized by 5 points.

3. Reporting Rules of Statistical Analyses

General Principle: In computational processes, retain as many digits as possible, applying reporting rules only to the final results. Adhere to the principle of the standard error of the estimated percentage. Reserve the term 'standard error' to refer to an estimate of the standard deviation (square root of the variance) of a statistic.

General Reporting Rule: For any statistic, report its standard error to two significant digits, and report the statistic itself to match the number of decimal places of the standard error. This rule, adopted from Wayne A. Fuller (Iowa State University), ensures that the maximum percentage error in a confidence interval is approximately five percent (Miller, 2006, LECTURE NOTES FOR SURV 615).

Example:

Below we present on the left some output, where the estimate is presented above its standard error which is parentheses. The reported values using the general reporting rule are presented to the right.

Output	Reported
190.23546	190.2
(**1.2**3546)	(1.2)
0.18235	0.2
(**2.2**3546)	(2.2)
56749. 94956	56750
(**23**4.57689)	(230)

Other special cases should be handled as follows:

t statistics and F statistics	Two decimal places (e.g. t = 1.96)
Means and Regression Coefficients	Decimals to match standard errors
Standard Errors	Two significant digits
Covariance Matrix	Five significant digits

These rules should help ensure clarity and consistency when reporting statistical results.

Homework submissions that do not follow reporting rules will be penalized by 5 points.

Note:

SAS, SPSS, and other statistical software packages do not use this rule. You need to control what is presented to conform to the rule you choose to follow.

4. Handwritten Pledge:

On the front cover of your assignment, you must handwrite and sign the honor pledge. This step is crucial as it aligns with academic integrity policies. The pledge should read:

Honor Pledge:

 "I pledge on my honor that I have not given or received any unauthorized assistance on this assignment/examination."

Signature: [Your Signature]
Date: [Today's Date]

Make sure your handwriting is clear and legible.

Putting It All Together:

Your final submission should be organized and neatly compiled. It should include, in order:
   1. Front cover with the handwritten pledge.
   2. The detailed, step-by-step calculations.
   3. The code and its output.

Ensure that all pages are numbered and labeled clearly if the assignment covers multiple pages. If submitting digitally, make sure that all parts of your submission are in a single, coherent document or sequence of files as per your instructor's guidelines. For physical submissions, make sure everything is securely stapled or bound together.

By following these guidelines, you'll create a clear, comprehensive, and academically honest submission for your assignment. Good luck!

1. [5 points] A researcher who wants to study the predictors of lung cancer draws a sample of persons with lung cancer from a database of lung cancer patients and a sample of persons without lung cancer from the general population. Is this a prospective or retrospective study?

2. [5 Points] A researcher who wants to study the impact of Vitamin D on children's health draws a sample of children, randomly splits them into two groups and gives one group Vitamin D and the other group a placebo. Is this a prospective or retrospective study?

3. The following data are based on a study (Petrovčič, et al, 2016) that varied the content of an email message asking persons to participate in a survey. One group received a message that included a "plea for help." The other group received a message that did NOT include a plea for help. Here are the results:

Message includes a plea for help	Respond To Survey	
	Yes	No
Yes	117	1,131
No	94	1,158

3. a) [10 points] Estimate the relative risk of responding (plea for help vs not), and report a 95% confidence interval for log-relative risk.

3. b) [10 points] Estimate the odds ratio (plea for help vs not), and report a 95% confidence interval for the log-odds ratio.

3. c) [5 points] Summarize and interpret your findings from parts a) and b). Does the "plea for help" improve response rates?

4. a) [10 points] The following table is loosely based upon a study of the impact of different types of incentives on survey response rates (Deutskens, et al., 2004). Cases were randomized to either receiver a voucher that the respondent could spend at specific online vendors, or a donation would be made on their behalf. The first question is whether vouchers produce lower or higher response rates relative to donations. Calculate the odds ratio of a voucher producing response relative to donation. Calculate the deviance (G^2).

| | Respond To Survey | |
	Yes	No
Voucher	166	564
Donation	121	609

4. b) [10 points] Next, we want to compare vouchers to a lottery. Calculate the odds ratio for a voucher to produce response relative to a lottery. Calculate the deviance (G^2).

| | Respond To Survey | |
	Yes	No
Voucher	166	564
Lottery	132	598

4. c) [10 points] Describe the results from the analysis of 4a and 4b. Does there appear to be differences in response rates across each of the type of incentive comparisons in 4a and 4b?

4. d) [10 points] Returning to the data from 4a. The deviance can tell us about association, but not about the direction of that association. Calculate a 95% confidence interval for the odds ratio calculated in 4a. Based on the odds ratio, which form of the incentive has the higher response rate? Is this difference significant?