

# Assignment Title

Your Name

2025-01-08

## Introduction

This assignment covers the key concepts and methods for [insert topic here]. The purpose is to demonstrate the understanding of the techniques discussed in the lectures and their application to real data sets.

### **i** Note

Replace [insert topic here] with a brief description of the assignment's main objective.

## Problem 1: [Problem Title]

### Question

Clearly state the question or problem that you are solving. Provide any given information, data, or equations.

### Solution

#### 1. Mathematical Formulas:

Typeset your mathematical formulas using LaTeX. For example:

$$\hat{\beta} = (X'X)^{-1}X'Y$$

#### 2. R Code for Calculation:

Use R code to perform any necessary calculations or data analysis:

```
# Example R code to generate a plot for Problem 1
library(ggplot2)
data <- data.frame(x = c(1, 2, 3, 4, 5), y = c(2, 4, 3, 5, 7))
ggplot(data, aes(x = x, y = y)) +
  geom_point() +
  geom_smooth(method = "lm", se = FALSE, color = "blue") +
  labs(
    title = "Scatter Plot with Regression Line for Problem 1",
    x = "Independent Variable",
    y = "Dependent Variable"
  )
```

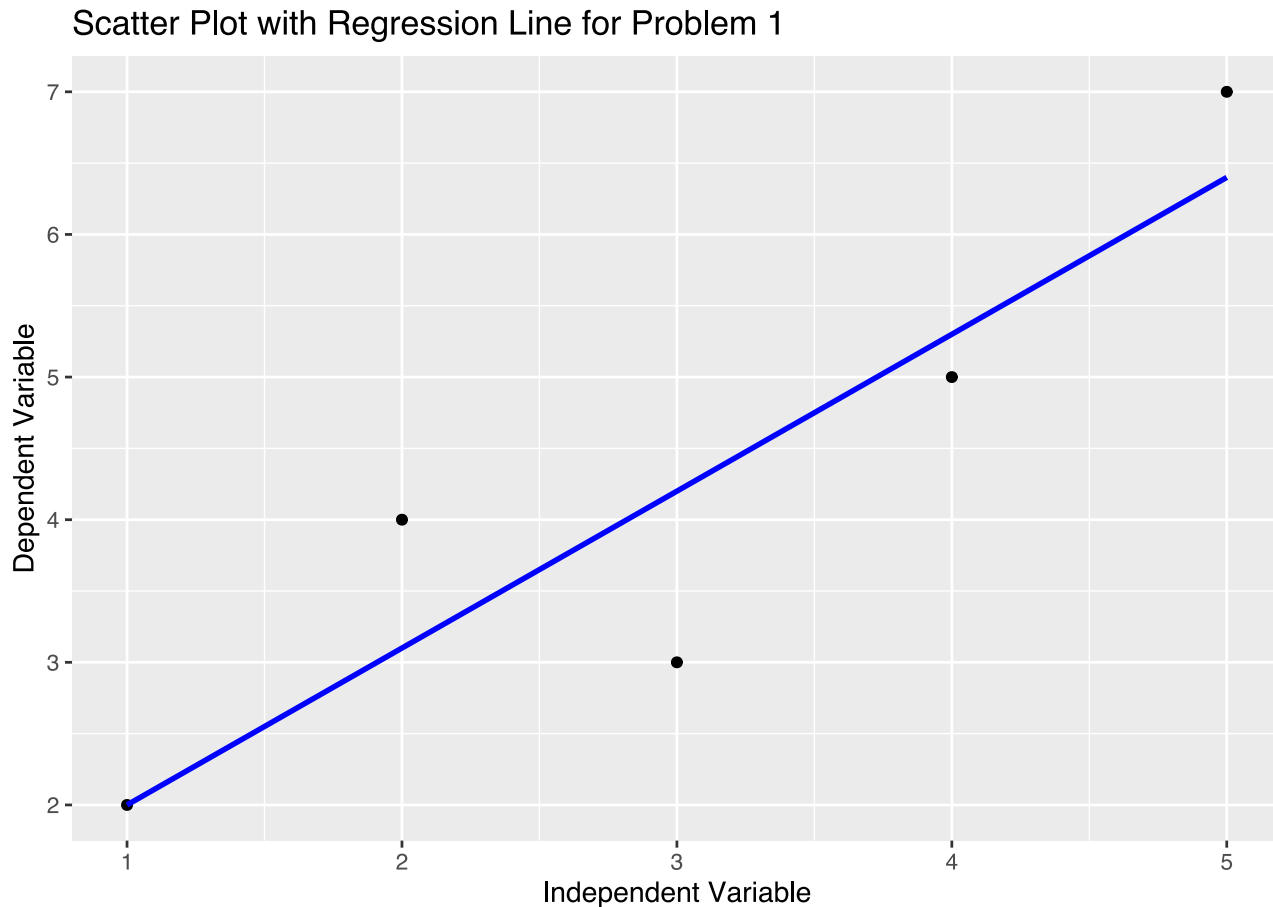


Figure 1

### 3. Interpretation:

Interpret the results of your analysis. For example, explain what the estimated coefficients represent and how they relate to the problem context.

#### **i** Note

Provide a clear explanation of the steps taken and their relevance to the solution.

## Problem 2: [Problem Title]

### Question

Provide a detailed description of the problem, including any given information.

### Solution

#### 1. Handwritten Calculations:

If you need to show any hand calculations, write them clearly and legibly, then scan or take a high-quality picture of your work. Embed the scanned image in your document:

![[Handwritten Calculation for Problem 2](path/to/your/image.png){ width=60% }

## 2. R Code for Analysis:

Include R code for any analysis required:

```
# Example R code for creating a histogram
hist(data$x, main = "Histogram of X Values", xlab = "X Values", col = "lightblue", border
= "black")
```

### Histogram of X Values



Figure 2

## Conclusion

Summarize the findings from each problem. Reflect on the results and any challenges encountered during the assignment.

### **i** Note

Discuss any additional insights gained from completing the assignment.

## Additional Instructions

- Ensure all R code chunks are labeled appropriately (fig- for figures, tbl- for tables).
- Make sure that all figures, tables, and equations are correctly referenced in the text.
- Remember to proofread your assignment before submission to check for clarity, accuracy, and formatting consistency.

### **i** Note

Follow these instructions to complete your assignment in the correct format.

## Include the following code for diagnostic and reproducibility purposes:

```
sessionInfo()
```

```
R version 4.4.2 (2024-10-31)
Platform: aarch64-apple-darwin24.1.0
Running under: macOS Sequoia 15.2

Matrix products: default
BLAS:   /opt/homebrew/Cellar/openblas/0.3.28/lib/libopenblas-r0.3.28.dylib
LAPACK: /opt/homebrew/Cellar/r/4.4.2_2/lib/R/lib/libRlapack.dylib; LAPACK version 3.12.0

locale:
[1] en_US.UTF-8/en_US.UTF-8/en_US.UTF-8/C/en_US.UTF-8/en_US.UTF-8

time zone: America/Denver
tzcode source: internal

attached base packages:
[1] stats      graphics  grDevices datasets  utils      methods    base

other attached packages:
[1] ggplot2_3.5.1

loaded via a namespace (and not attached):
 [1] vctrs_0.6.5      nlme_3.1-166     cli_3.6.3        knitr_1.49
 [5] rlang_1.1.4      xfun_0.49        renv_1.0.11      generics_0.1.3
 [9] jsonlite_1.8.9   labeling_0.4.3   glue_1.8.0       colorspace_2.1-1
[13] htmltools_0.5.8.1 scales_1.3.0      rmarkdown_2.29   grid_4.4.2
[17] evaluate_1.0.1   munsell_0.5.1    tibble_3.2.1     fastmap_1.2.0
[21] yaml_2.3.10      lifecycle_1.0.4  compiler_4.4.2   dplyr_1.1.4
[25] pkgconfig_2.0.3  mgcv_1.9-1       farver_2.1.2     lattice_0.22-6
[29] digest_0.6.37    R6_2.5.1         tidyselect_1.2.1 splines_4.4.2
[33] pillar_1.10.0    magrittr_2.0.3   Matrix_1.7-1     withr_3.0.2
[37] tools_4.4.2      gtable_0.3.6
```

## Bibliography