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.

> **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:

```r
# 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"
    )
```

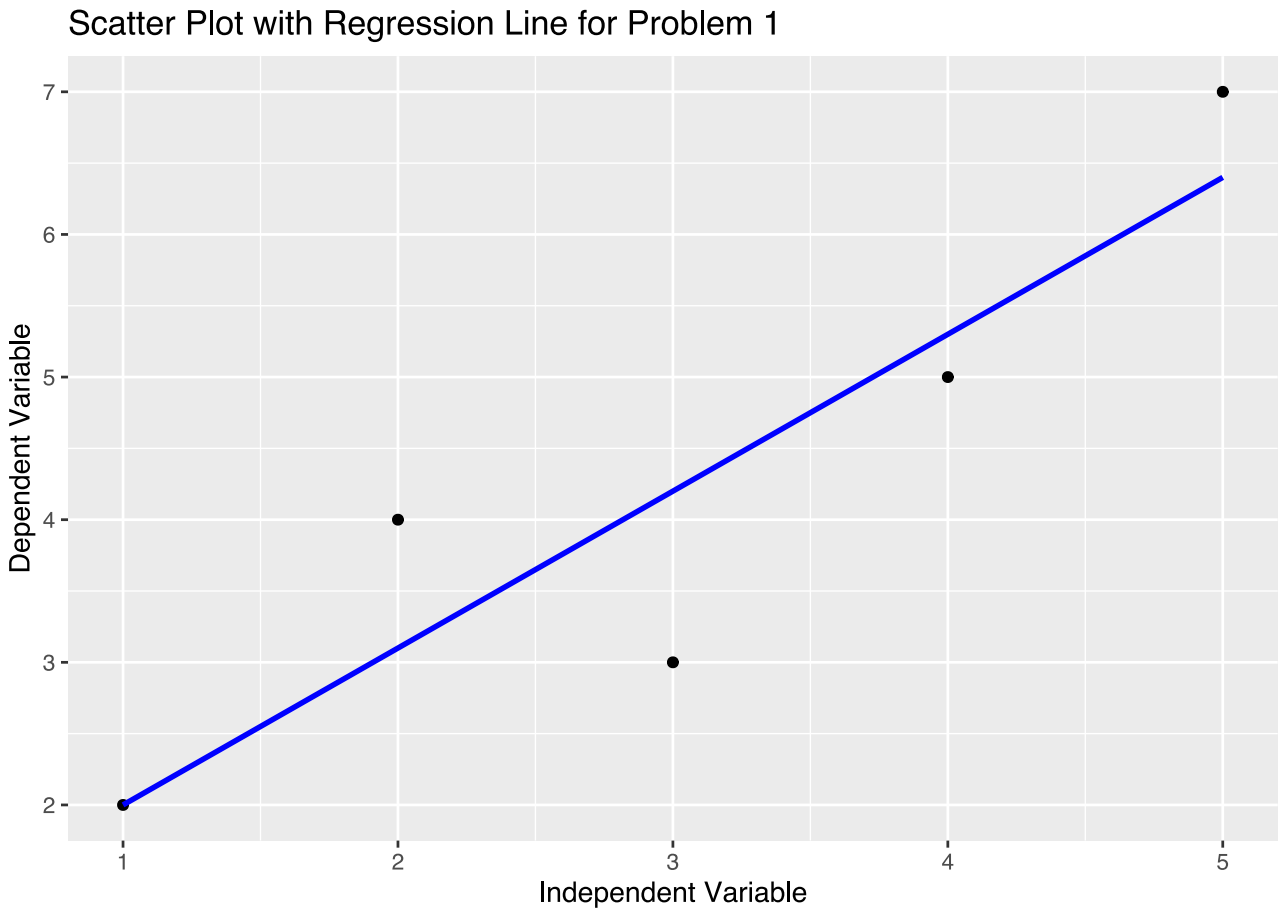

Figure 1

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")
```

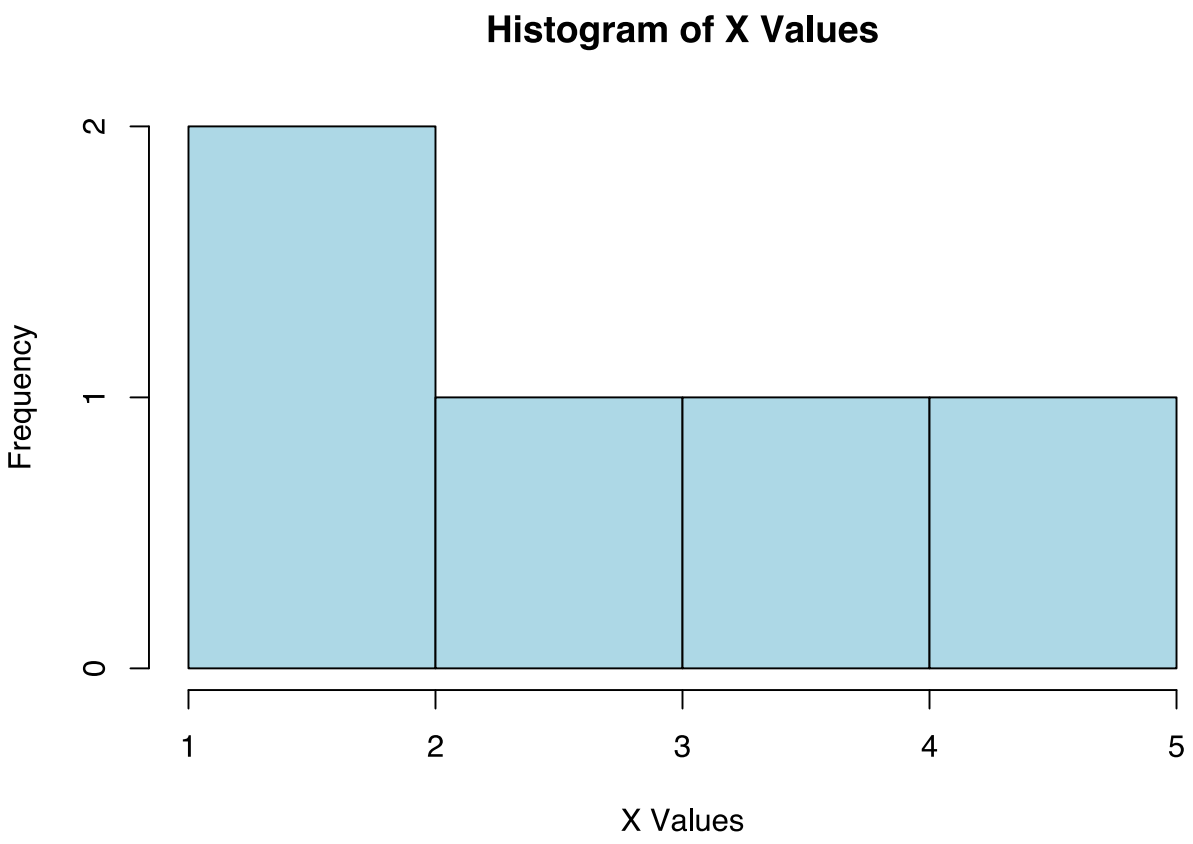

Figure 2

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.

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

Include he 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/libopenblasp-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