Homework 3 Report

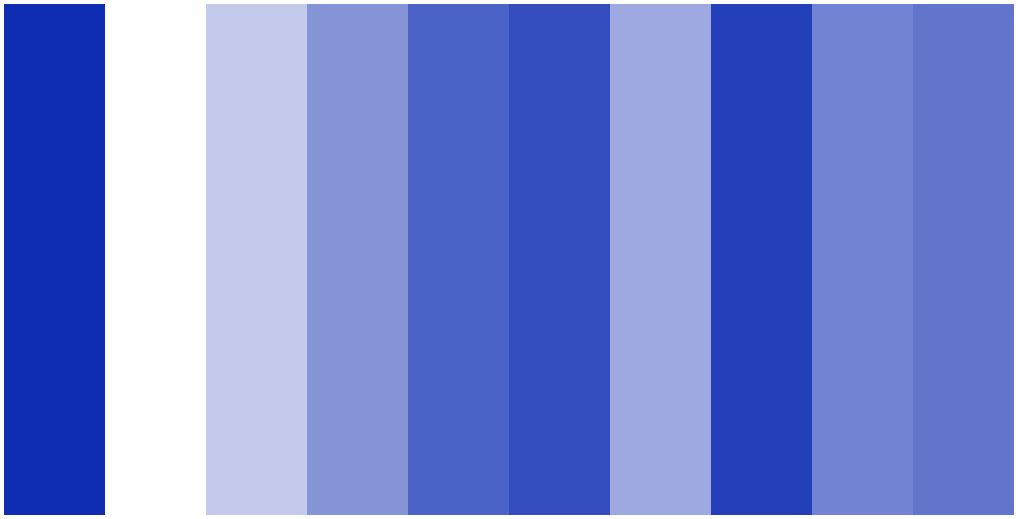
Larry Nguyen

Setup

```
# Load packages
library(tidyverse)
library(colorfindr)

# Load data
data <- read_csv("homework3_data.csv")
data <- mutate(data, design = factor(design, levels = c(0, 1), labels = c("Old", "New")))

# Load Zeiss color palette (Part 3)
colors <- get_colors("C:/Users/Admin/Pictures/Capture.PNG")
colors <- make_palette(colors[1:100,])
```



Part 1

Make a recommendation to the company: Should they commit to redesigning the web site based on the criteria for success that they laid out?

Yes, the company should commit to redesigning the website because the data shows (part 2) that it would lead to an average increase in sales of at least $1.80 per customer.

Part 2

Provide supporting evidence for your recommendation.

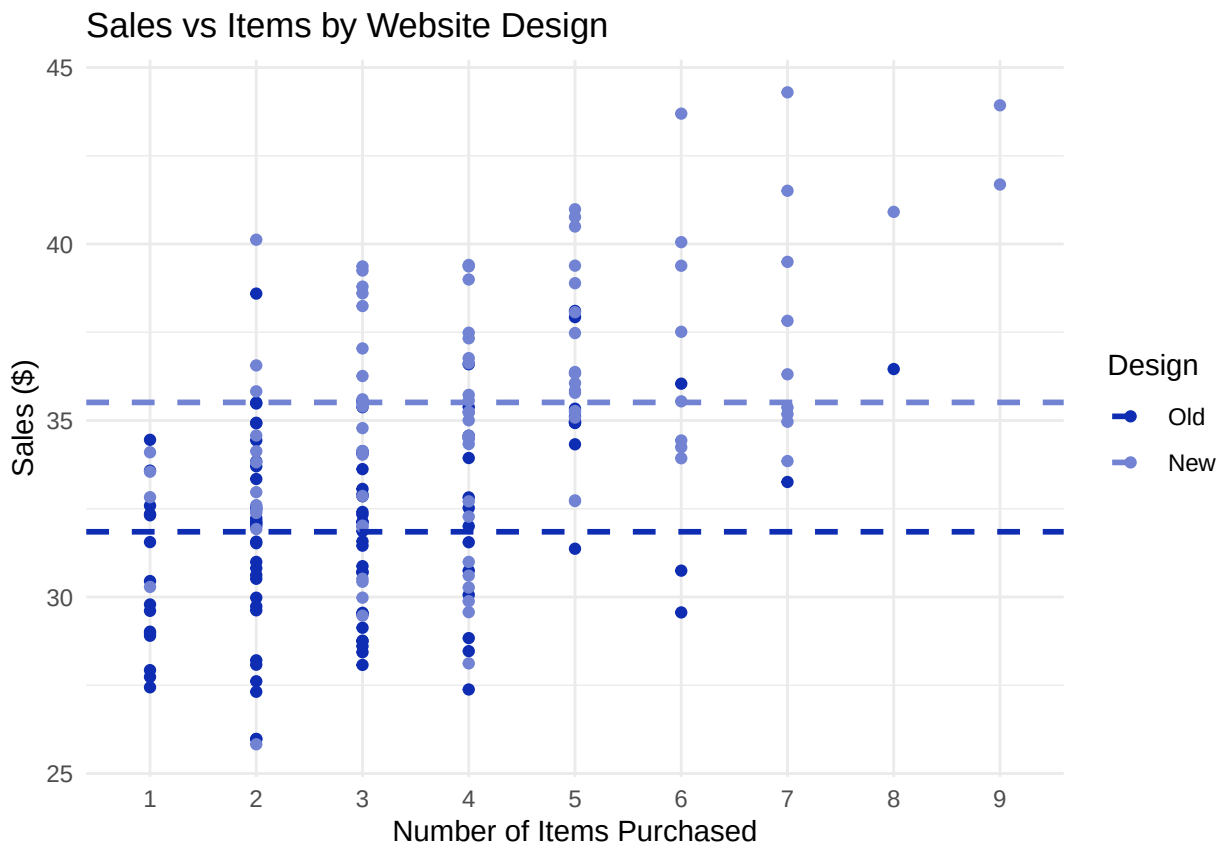
(a)

You must use at least 2 graphical presentations that support your recommendation

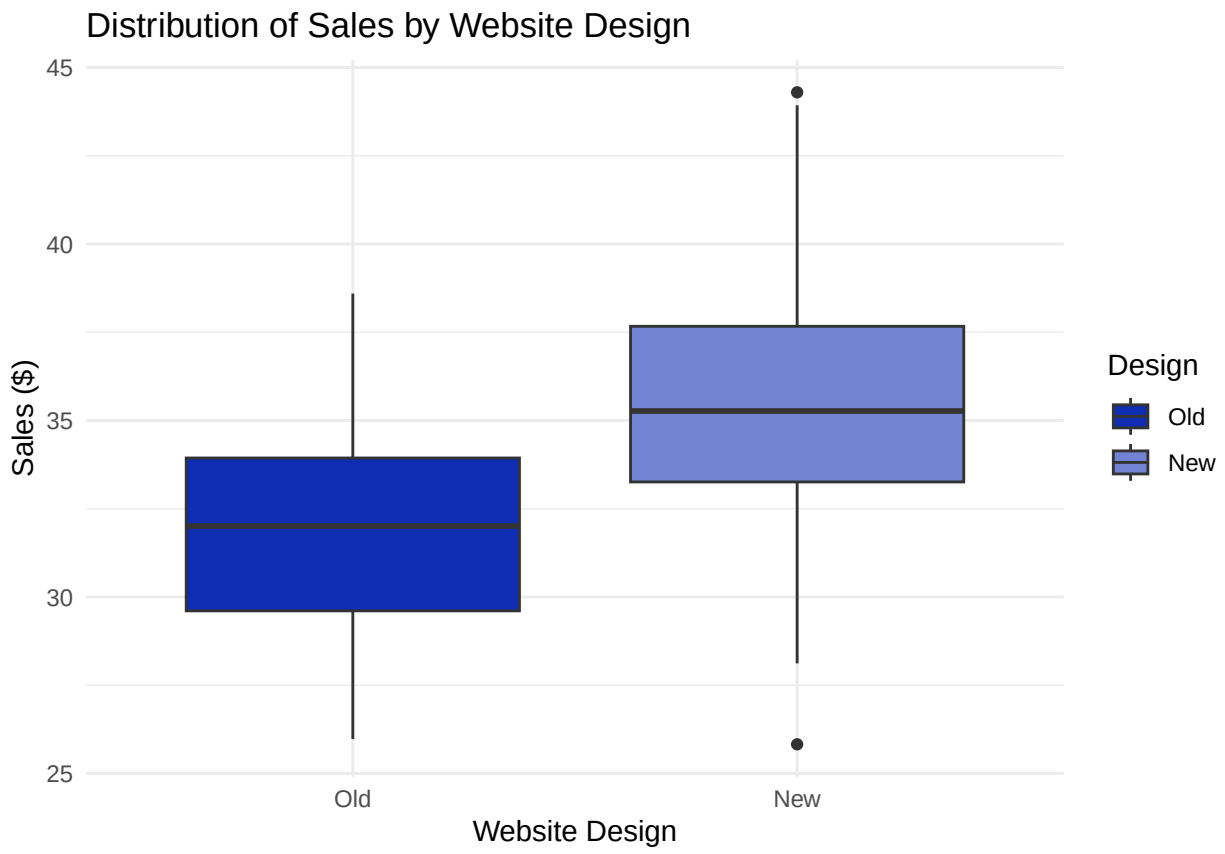
```
# Get mean sales from old and new designs
mean_sales <- group_by(data, design) %>%
  summarise(mean_sales = mean(sales))

# Get median sales from old and new designs
median_sales <- group_by(data, design) %>%
  summarise(median_sales = median(sales))

# Plot 1
ggplot(data, aes(x = factor(items), y = sales, color = design)) +
  geom_point() +
  geom_hline(data = mean_sales, aes(yintercept = mean_sales, color = design), linetype = "dashed", size
  scale_color_manual(values = c("#0F2DB3", "#7183D2")) +
  labs(x = "Number of Items Purchased",
       y = "Sales ($)",
       color = "Design",
       title = "Sales vs Items by Website Design") +
  theme_minimal()
```




```
# Plot 2
ggplot(data, aes(x = design, y = sales, fill = design)) +
  geom_boxplot() +
  scale_fill_manual(values = c("#0F2DB3", "#7183D2")) +
  labs(x = "Website Design",
       y = "Sales ($)",
       fill = "Design",
       title = "Distribution of Sales by Website Design") +
  theme_minimal()
```




```
# Confidence interval
model <- lm(sales ~ design, data = data)
confint(model)
```

```
##                 2.5 %    97.5 %
## (Intercept) 31.226168 32.470212
## designNew    2.780801  4.549008
```

Supporting premise statements:

1. The scatterplot of sales versus number of items purchased shows that the new design generally has higher sales than the old design, with horizontal dashed lines indicating higher average sales for the new design.
2. The boxplot of sales by website design shows that the distribution of sales for the new design is shifted upward relative to the old design, with the median being higher.
3. A linear regression of sales on design shows that the new design has an estimated increase in sales of $3.67 per customer, with a 95% confidence interval from $2.78 to $4.55, exceeding $1.80.

(b)

You must estimate how much sales will increase/decrease if the redesign is done.

The average sale per customer under the new design is approximately $35.51, compared to $31.85 under the old design, giving an estimated increase of $3.67 per customer (as shown in Plot 1 with horizontal mean

lines). The median sales also increase from $32.01 to $35.27, an estimated increase of $3.26 per customer (as shown in Plot 2 with the boxplot). Thus, the overall increase in sales is estimated to be between $3.26 to $3.67 per customer when the redesign is done.

(c)

You must address the question of whether the redesign will lead to an average increase in sales of at least $1.80 per customer

Both the mean and median increases exceed $1.80 per customer, indicating that the redesign is expected, on average, to increase sales by at least $1.80 per customer. Also, the 95% confidence interval shows that the lower bound of $2.78 exceeds $1.80, providing further evidence that the redesign will increase sales.

Part 3

Your graphical presentations must use the "company" color palette.

The color palette used for plots is derived from the company, Zeiss.

Part 4

Consider your final recommendation as the primary statement. State an alternative statement and make a fault tree for that statement

The observed increase from the data may not be due to the design itself, but rather by special offers and discounts. For instance, the new design may have been giving out promotions for select customers, such as loyal shoppers or users in specific regions, which could have temporarily increased the average sale per customer independently of the website design.