*Instructions
Please show your work! You may lose points by simply writing in the answer. If the problem requires you to execute co
Your homework should be submitted electronically on GitHub.
This problem set is due before 23:59 on Sunday December 4, 2022. No late assignments will be accepted.

*Question 1: Economics In this question, use the `prestige` dataset in the `car` library. First, run the following com

```
install.packages(car)
library(car)
data(Prestige)
help(Prestige)
```

We would like to study whether individuals with higher levels of income have more prestigious jobs. Moreover, we would

(a)Create a new variable `professional` by recoding the variable `type` so that professionals are coded as 1, and blue and w

(b)Run a linear model with `prestige` as an outcome and `income`, `professional`, and the interaction of the two as predict

[!htbp] Regression Results with interaction: prestige income + professional_dummy

	D
income	
professional_dummy	
income:professional_dummy	
Constant	
Observations	
R^2	
Adjusted R^2	
Residual Std. Error	
F Statistic	115
Note:	*p<0.

p-value of the coefficient for professional_dummy is smaller than 0.01, we can reject the null hypothesis that there is no
p-value of the coefficient for interaction of income and professionaldummy is smaller than 0.01, we can reject the null hy

(c)Write the prediction equation based on the result.
$\hat{y} = 21.142 + 0.003x_1 + 37.781x_2 - 0.002x_1x_2$
x_1 for income, x_2 for professional_dummy

(d)Interpret the coefficient for `income`.
There is a positive and statistically reliable relationship between income and prestige score. When holding the effects of

(e)Interpret the coefficient for `professional`.
There is a positive and statistically reliable relationship between professional and prestige score. When holding the effec

(f) What is the effect of a $1,000 increase in income on prestige score for professional occupations? In other words, we are i
$0.003 * 1000 - 0.002 * 1000 * 1 = 3$ [language=R, firstline=34, lastline=37]PS4.R $\hat{y} = 1$
The effect of a $1,000 increase in income on prestige score for professional occupations is an increase in prestige by 1.

(g) What is the effect of changing one's occupations from non-professional to professional when her income is $6,000? We a
$\hat{y} = 37.781 * 1 - 0.002 * 6000 * 1$ [language=R, firstline=40, lastline=43]PS4.R $\hat{y} = 25.781$
The effect of changing one's occupations from non-professional to professional when her income is $6,000 is an increase i

*Question 2: Political Science Researchers are interested in learning the effect of all of those yard signs on voting pr

Below is the result of a regression with two variables and a constant. The dependent variable is the proportion of th

Notes: R^2=0.094, N=131

(a)Use the results from a linear regression to determine whether having these yard signs in a precinct affects vote share (e.g
Hypothesis: $H_0 : B_1 = 0 vs. H_a : B_1 \neq 0$
Test-Statistics:
$standarderror : 0.016, t = (0.042 - 0)/0.016 = 2.625, degreeof freedom : n - 3 = 131 - 3 = 128$ [language=R, firstline=5
P-value:
[language=R, firstline=56, lastline=58]PS4.R $p - value = 0.0097 < 0.05$
Conclusion: we can reject the null hypothesis that the slope of having these yard signs in a precinct is 0.

(b)Use the results to determine whether being next to precincts with these yard signs affects vote share (e.g., conduct a hy
Hypothesis: $H_0 : B_2 = 0 vs. H_a : B_2 \neq 0$
Test-Statistics:
$standarderror : 0.013, t = (0.042 - 0)/0.013 = 2.625, degreeof freedom : n - 3 = 131 - 3 = 128$ [language=R, firstline=6
P-value:
[language=R, firstline=68, lastline=70]PS4.R $p - value = 0.0016 < 0.05$
Conclusion: we can reject the null hypothesis that the slope of being next to precincts with yard signs is 0.

(c)Interpret the coefficient for the constant term substantively.
When the precinct is not assigned lawn signs or the precinct is not adjacent to lawn signs, the vote share of this precinc

(d)Evaluate the model fit for this regression. What does this tell us about the importance of yard signs versus other factor
The R^2 of the model is 9.4%, which means 9.4% of the variations are explained by the yard signs, and the rest 90.6% of