

# MATH 4753 Project Template

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## Abstract

This project is all about applications of SLR to real data using R

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Figure 1: Dr. Wayne Stewart

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## Introduction

Here you should introduce the data and the problem you wish to solve. Use your own subheadings. Fill with informative sentences and pictures and links. You may include sub-sub headings. You can cite from your bibliography (see Millar 2011 and Crawley (2012))

### What are the variables?

```
data(mtcars)
head(mtcars)
```

	mpg	cyl	disp	hp	drat	wt	qsec	vs	am	gear	carb
Mazda RX4	21.0	6	160	110	3.90	2.620	16.46	0	1	4	4
Mazda RX4 Wag	21.0	6	160	110	3.90	2.875	17.02	0	1	4	4
Datsun 710	22.8	4	108	93	3.85	2.320	18.61	1	1	4	1
Hornet 4 Drive	21.4	6	258	110	3.08	3.215	19.44	1	0	3	1
Hornet Sportabout	18.7	8	360	175	3.15	3.440	17.02	0	0	3	2
Valiant	18.1	6	225	105	2.76	3.460	20.22	1	0	3	1

```
names(mtcars)
```

```
## [1] "mpg" "cyl" "disp" "hp" "drat" "wt" "qsec" "vs" "am" "gear"
## [11] "carb"
```

Sub sub headings can be useful

Plot data

```
library(ggplot2)
g = ggplot(mtcars, aes(x = disp, y = mpg, color = cyl)) + geom_point()
g = g + geom_smooth(method = "loess")
g
```

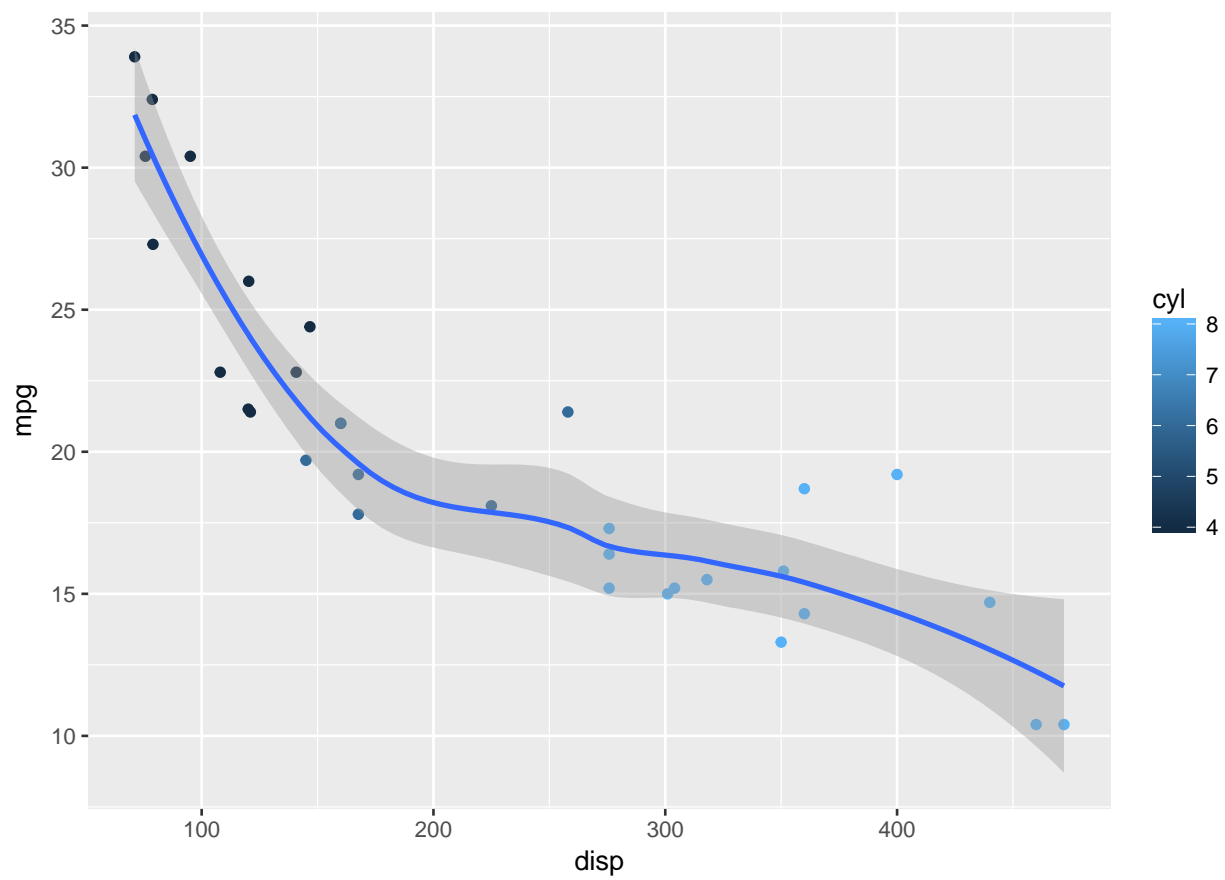


Figure 2: MTCARS

How were the data collected?

What is the story behind the data?

Why was it gathered?

What is your interest in the data?

Include pictures ! [] (jpeg)

What problem do you wish to solve

Theory needed to carry out SLR

Main result 1

Main result 2

Main result 3 etc

Validity with mathematical expressions

The following function was taken from <https://rpubs.com/therimalaya/43190>

Checks on validity

Straight trend line

Use trendscatter

Errors distributed Normally

$$\epsilon_i \sim N(0, \sigma^2)$$

Shapiro-wilk

Constant variance

Residual vs fitted values

trendscatter on Residual Vs Fitted

Zero mean value of  $\epsilon$

Independence of data

## Analysis of the data

Make sure you include many great plots

Add the trend to the data

Summary lm object

Interpretation of all tests

Interpretation of multiple R squared

Interpretation of all point estimates

Calculate cis for  $\beta$  parameter estimates

Use of `predict()`

Use of `ciReg()`

Check on outliers using cooks plots

Remember to interpret this plot and all other plots

## Model selection if you compared models

Use adjusted  $R^2$

$$R_{adj}^2 =$$

## Conclusion

Answer your research question

Suggest ways to improve model or experiment

## References

- Crawley, Michael J. 2012. “Regression.” In *The R Book*, 449–97. Chichester, UK: John Wiley & Sons, Ltd.
- Millar, Russell B. 2011. “Latent Variable Models.” In *Statistics in Practice*, 202–32. Chichester, UK: John Wiley & Sons, Ltd.