Example of R Markdown for PDF output

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Problem 1

$$
\begin{aligned}
\text{Var}(\hat{\beta}) &= \text{Var}((X'X)^{-1}X'Y) \\
&= (X'X)^{-1}X'\text{Var}(Y)((X'X)^{-1}X')' \\
&= (X'X)^{-1}X'\text{Var}(Y)X(X'X)^{-1} \\
&= (X'X)^{-1}X'\sigma^2 IX(X'X)^{-1} \\
&= (X'X)^{-1}\sigma^2
\end{aligned} \tag{1}
$$

See Equation (1).

Problem 2

```
# === Visualization === #
ggplot(virginica, aes(x=Sepal.Length, y=Petal.Length))+
  geom_point()+
  # --- Add a regression line --- #
  geom_smooth(method = lm, se = FALSE)+
  # --- Change the background --- #
  theme_bw()+
  # --- Center the title --- #
  theme(plot.title = element_text(hjust = 0.5))
```

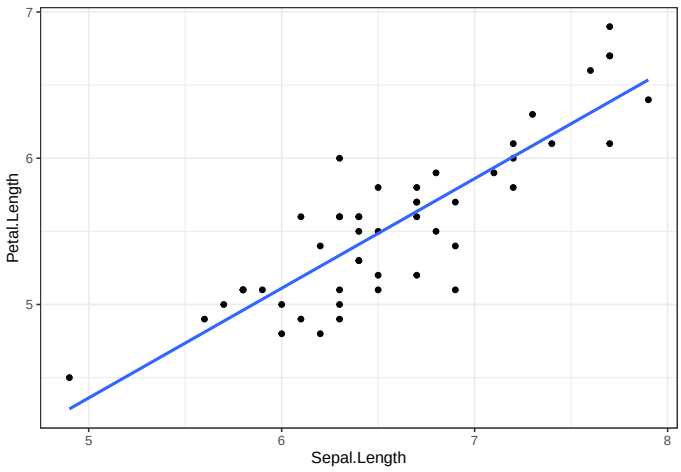

Figure 1: Relationship between Sepal.Length and Petal.Length

Figure 1 shows the relationship between Sepal.Length and Petal.Length.

Problem 3

```r
# === Load packages === #
library(modelsummary)

# === Load Data === #
data(hprice2, package = "wooldridge")

# === Estimate three models === #
reg1 <- lm(log(price) ~ log(nox), data = hprice2)
reg2 <- lm(log(price) ~ log(nox) + rooms, data = hprice2)
reg3 <- lm(log(price) ~ log(nox) + rooms + I(rooms^2), data = hprice2)

# === Show the Results === #
ls_models <-
  list(
    "OLS 1" = reg1,
    "OLS 2" = reg2,
    "OLS 3" = reg3
  )

modelsummary(
  models = ls_models,
  output = "flextable",
  fmt = "%.2f",
  coef_map = c(
    "log(nox)" = "log(Nox)",
    "rooms" = "Rooms",
    "I(rooms^2)" = "Rooms sq"
    ),
  vcov = "HC3",
  stars  =  c("*" = .05, "**" = .01, "***" = .001),
  gof_map = c("nobs", "r.squared"),
  notes = list("Note: Robust Std. Errors in parentheses.")
  )
```

Table 1: Example Regression Results

	OLS 1	OLS 2	OLS 3
log(Nox)	-1.04***	-0.72***	-0.79***
	(0.08)	(0.07)	(0.08)
Rooms		0.31***	-0.76**
		(0.03)	(0.29)
Rooms sq			0.08***
			(0.02)
Num.Obs.	506	506	506
R2	0.264	0.514	0.549

* p < 0.05, ** p < 0.01, *** p < 0.001

Note: Robust Std. Errors in parentheses.

Table 1 shows an example of regression summaty table.