Chap4

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First, set working directory. 'data' is a table with three columns and same number of rows, and should be numeric. Columns have headers indicating the names of the variables. **User will also input desired variable names in double quotes**

```
data <- read.csv("chap4.csv", header = FALSE, skip = 1)
colnames(data) = c("Age", "SpeechRate", "CorrectRecall")
```

View the data.

```
knitr::kable(xtable(data))
```

Age	SpeechRate	CorrectRecall
4	1	14
4	2	23
7	2	30
7	4	50
10	3	39
10	6	67

Calculate the mean for all columns

```
summarise_all(data,mean)
```

```
##   Age SpeechRate CorrectRecall
## 1   7          3      37.16667
```

Calculate the standard deviation for all columns

```
summarise_all(data,sd)
```

```
##        Age SpeechRate CorrectRecall
## 1 2.683282   1.788854      19.21891
```

Replace 'var1', 'var2', and 'var3' to an appropriate first, second, and third column name using CTRL+F. **Only check off 'Match case' to avoid overwriting additional code.**

```
column = colnames(data)
colnames(data) <- c("V1", "V2", "V3")
var1 = data$V1
var2 = data$V2
var3 = data$V3
```

We now perform an orthogonal multiple regression analysis on the data

```
multi_reg1=lm(var3~var1+var2,data=data)
```

We now compute the predicted values and the residuals, then print the results on a single table. Replace 'var3', the dependent variable, to an appropriate column name using CTRL+F. **Only check off 'Match**

case' to avoid overwriting additional code.

```
Y_hat=predict(multi_reg1)
Residual=round(residuals(multi_reg1),2)
knitr::kable(xtable(data.frame(Y=var3,Y_hat,Residual)))
```

Y	Y_hat	Residual
14	15.16667	-1.17
23	24.66667	-1.67
30	27.66667	2.33
50	46.66667	3.33
39	40.16667	-1.17
67	68.66667	-1.67

We now compute the sum of squares of the residuals, then print the result

```
SS_residual=sum(Residual^2)
print(SS_residual)
```

```
## [1] 24.8334
```

We now compute the correlation matrix between the variables. **User will also input desired variable names in double quotes**

```
colnames(data) = c("Age", "SpeechRate", "CorrectRecall")
r_mat=cor(data)
Corr=round(r_mat,4)
knitr::kable(xtable((Corr)))
```

	Age	SpeechRate	CorrectRecall
Age	1.0000	0.750	0.8028
SpeechRate	0.7500	1.000	0.9890
CorrectRecall	0.8028	0.989	1.0000

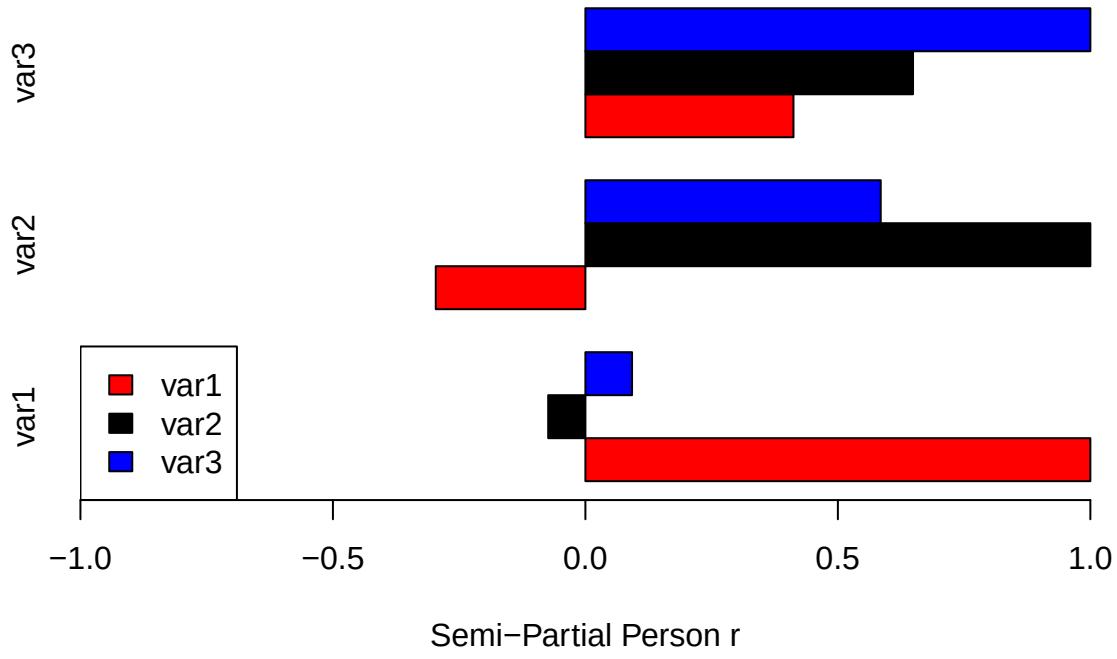
We now compute the semi-partial coefficients, then print the results. Replace 'var1', 'var2', and 'var3' to an appropriate first, second, and third column name using CTRL+F. **Only check off 'Match case' to avoid overwriting additional code.**

```
colnames(data) <- c("V1", "V2", "V3")
var1 = data$V1
var2 = data$V2
var3 = data$V3
semi_r = spcor(data)
semi_part=data.frame(var1=semi_r$estimate[3,1]^2, var2=semi_r$estimate[3,2]^2)
knitr::kable(xtable((semi_part)))
```

var1	var2
0.0085281	0.342072

Plotting the semi-partial correlations

```r
colnames(data) = c("var1", "var2", "var3")
semi_r = spcor(data)
barplot(semi_r$estimate, beside=TRUE, horiz=TRUE,
        col=c("red","black","blue"),
        xlab="Semi-Partial Person r", xlim=c(-1,1))
legend("bottomleft", legend=c("var1","var2","var3"), fill=c("red","black","blue"))
```



Multi-Regression Analysis

```r
print(summary(multi_reg1))
```

```
##
## Call:
## lm(formula = var3 ~ var1 + var2, data = data)
##
## Residuals:
##      1      2      3      4      5      6
## -1.167 -1.667  2.333  3.333 -1.167 -1.667
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)    1.667      3.598   0.463  0.67470
## var1           1.000      0.725   1.379  0.26162
## var2           9.500      1.087   8.736  0.00316 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
```

```
## Residual standard error: 2.877 on 3 degrees of freedom
## Multiple R-squared:  0.9866, Adjusted R-squared:  0.9776
## F-statistic: 110.1 on 2 and 3 DF,  p-value: 0.001559
```

ANOVA analysis

```
print(anova(multi_reg1))
```

```
## Analysis of Variance Table
##
## Response: var3
##           Df  Sum Sq Mean Sq F value   Pr(>F)
## var1       1 1190.25 1190.25 143.789 0.001248 **
## var2       1  631.75  631.75  76.319 0.003158 **
## Residuals  3   24.83    8.28
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```