Sparrow Dataset Analysis

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R Coding with the Sparrow Dataset

This data is a stratified random sample of 116 Savannah sparrows at Kent Island. The **weight (in grams)** and **wing length (in mm)** were obtained for birds from nests that were reduced, controlled, or enlarged. The data are available in the file `Sparrows` from the R package `Stat2Data`.

Objectives a,b,c,d,e

a. Load in the `Sparrows` data set from the R package `Stat2Data`, using the `str()` function to inspect data structure and further display the first 5 rows with `head()`.
b. Create a scatterplot of weight versus wing length using `ggplot()`, and add a fitted regression line.
c. Fit a simple linear regression and display the summary output using `summary()`.
d. Use `par(mfrow=c(1,2))` to display the following two diagnostic plots side-by-side:
    - the residual vs fitted
    - Normal Q-Q
e. Use `par(mfrow=c(1,2))` to display the following two diagnostic plots side-by-side:
    - Cook's distance
    - Residual vs Leverage

```
install.packages('Stat2Data',repos='https://mirror.csclub.uwaterloo.ca/CRAN/')
```

```
## Installing package into 'C:/Users/francisco solis jr/AppData/Local/R/win-library/4.4'
## (as 'lib' is unspecified)
```

```
## package 'Stat2Data' successfully unpacked and MD5 sums checked
##
## The downloaded binary packages are in
##  C:\Users\francisco solis jr\AppData\Local\Temp\RtmpmmO547\downloaded_packages
```

```
library(Stat2Data)

# (a) show data structure and display the first 5 rows
data("Sparrows")
str(Sparrows)
```

```
## 'data.frame':    116 obs. of  3 variables:
##  $ Treatment : Factor w/ 3 levels "control","enlarged",..: 1 1 1 1 1 1 1 1 1 1 ...
##  $ Weight    : num  14.9 15 14.3 17 16 16.2 12.4 14.6 12.2 13 ...
##  $ WingLength: num  29 31 25 29 30 31.5 23.5 26 25.5 27 ...
```

```r
head(Sparrows,5)
```

```
##   Treatment Weight WingLength
## 1   control   14.9         29
## 2   control   15.0         31
## 3   control   14.3         25
## 4   control   17.0         29
## 5   control   16.0         30
```

```r
# (b) using ggplot to form the scatterplot
library(ggplot2)
```

```
## Warning: package 'ggplot2' was built under R version 4.4.3
```

```r
ggplot(Sparrows, aes(x=WingLength, y=Weight))+
  geom_point(color="black", size=1)+
  geom_smooth(method="lm",se=FALSE,color="blue", linetype="solid")+
  labs(title="Scatterplot of Weight vs Wing Length",
       x="Wing length(mm)",
       y="Weight (g)")
```

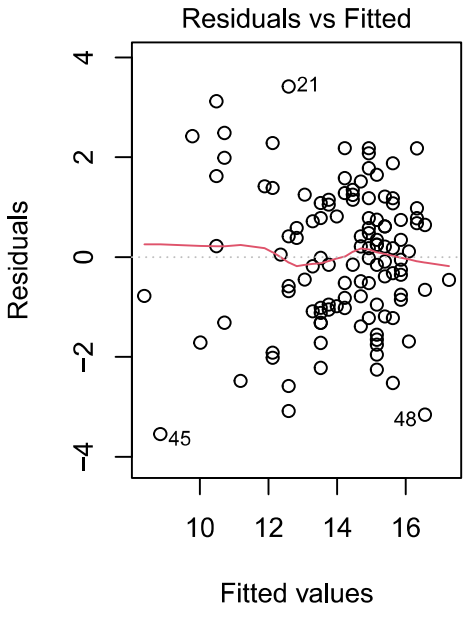
```
## `geom_smooth()` using formula = 'y ~ x'
```

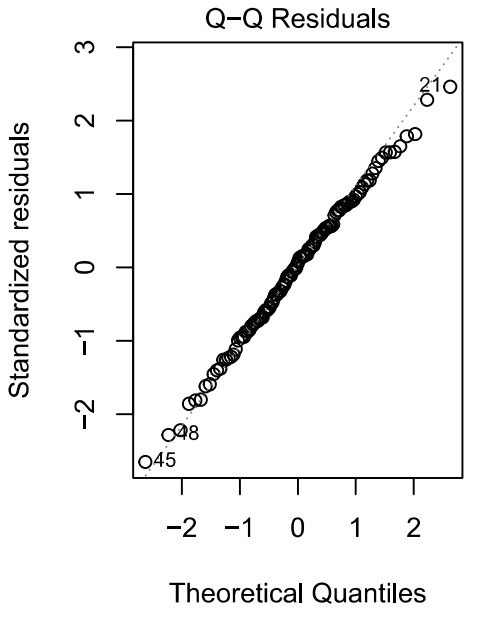
```r
# (c) Fiting a regression model and outputting the summary

SLR<-lm(Weight~WingLength, data=Sparrows)
summary(SLR)
```

```
##
## Call:
## lm(formula = Weight ~ WingLength, data = Sparrows)
##
## Residuals:
##     Min      1Q  Median      3Q     Max
## -3.5440 -0.9935  0.0809  1.0559  3.4168
##
## Coefficients:
##             Estimate Std. Error t value Pr(>|t|)
## (Intercept)  1.36549    0.95731   1.426    0.156
## WingLength   0.46740    0.03472  13.463   <2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.4 on 114 degrees of freedom
## Multiple R-squared:  0.6139, Adjusted R-squared:  0.6105
## F-statistic: 181.3 on 1 and 114 DF,  p-value: < 2.2e-16
```

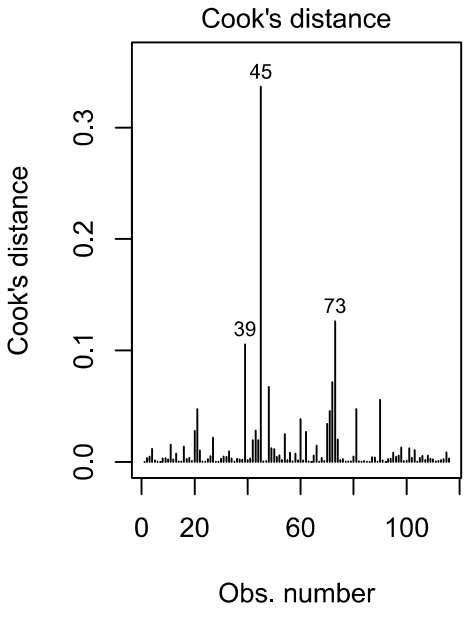
```r
# (d) Diagnostic plots (Residuals vs Fitted plot and Normal QQ plot)
par(mfrow=c(1,2))
plot(SLR,which=1:2)
```

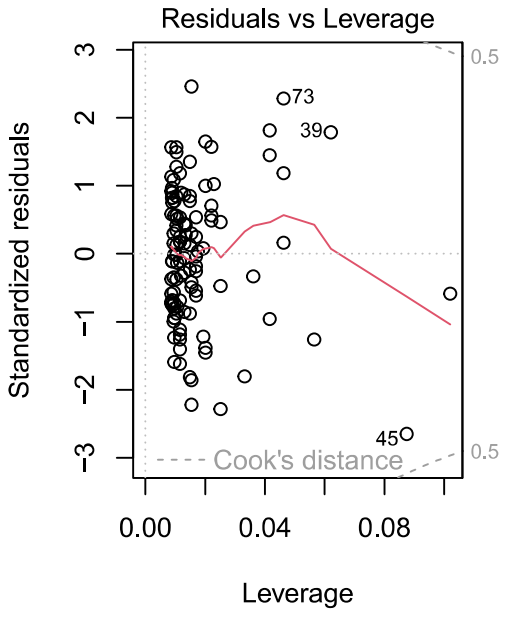





```r
par(mfrow=c(1,1))

# (e) Diagnostic plots (Cook's distance and Leverage plots)
par(mfrow=c(1,2))
plot(SLR,which=4:5)
```






```
par(mfrow=c(1,1))
```