Exercise 2.1

Plotting

useful commands: `hist()`, `barplot()`, `boxplot()`, `plot()` (for scatter plot)

useful arguments within plot(): `main`, `xlab`, `ylab`, `col`, `pch`, `cex`

00*. load the "crabs" dataset in the MASS package
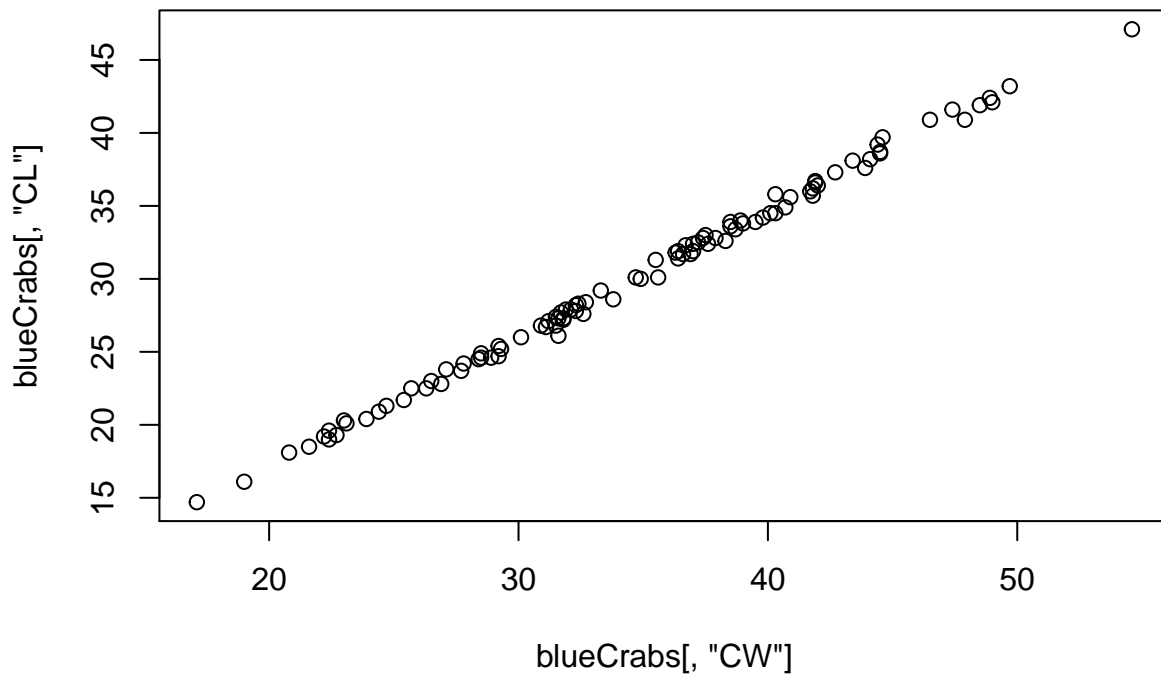
```
library("MASS")
data(crabs)
```

00*. subset the data to only include the blue crabs

```
blueCrabs = crabs[crabs[ ,"sp"] == "B", ]
```

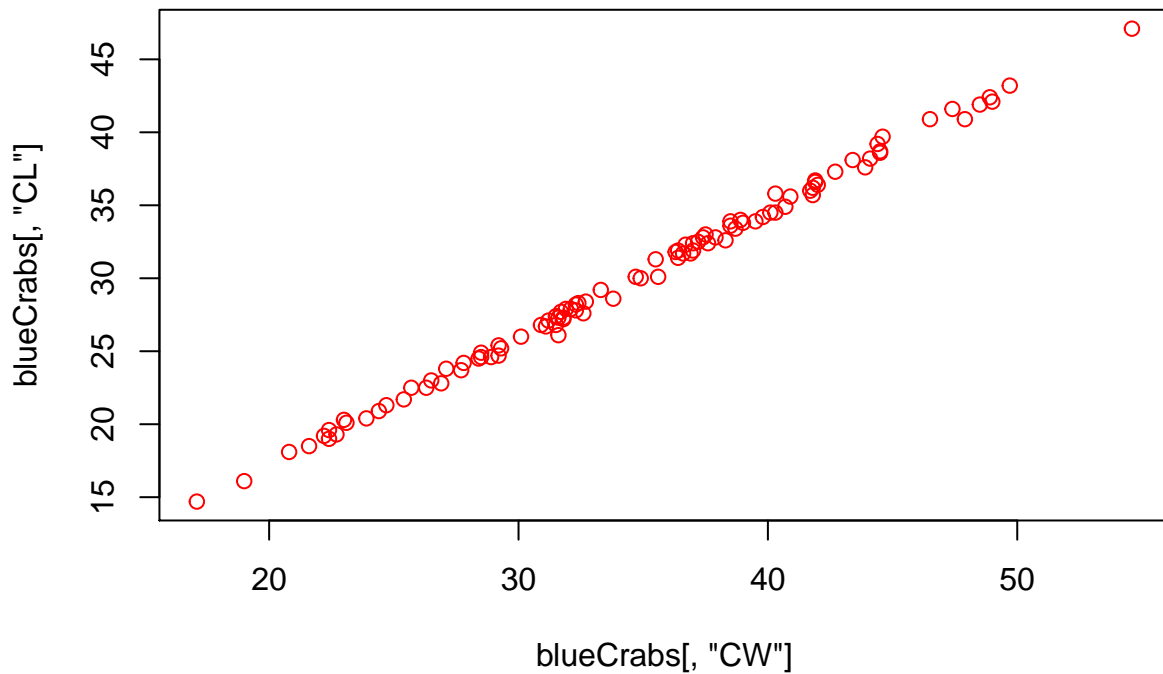**01*. plot carapace length versus carapace width of the blue crabs**

- 01a*. make a scatterplot using the 'plot' command

```
plot(x = blueCrabs[ , "CW"], blueCrabs[ , "CL"])
```
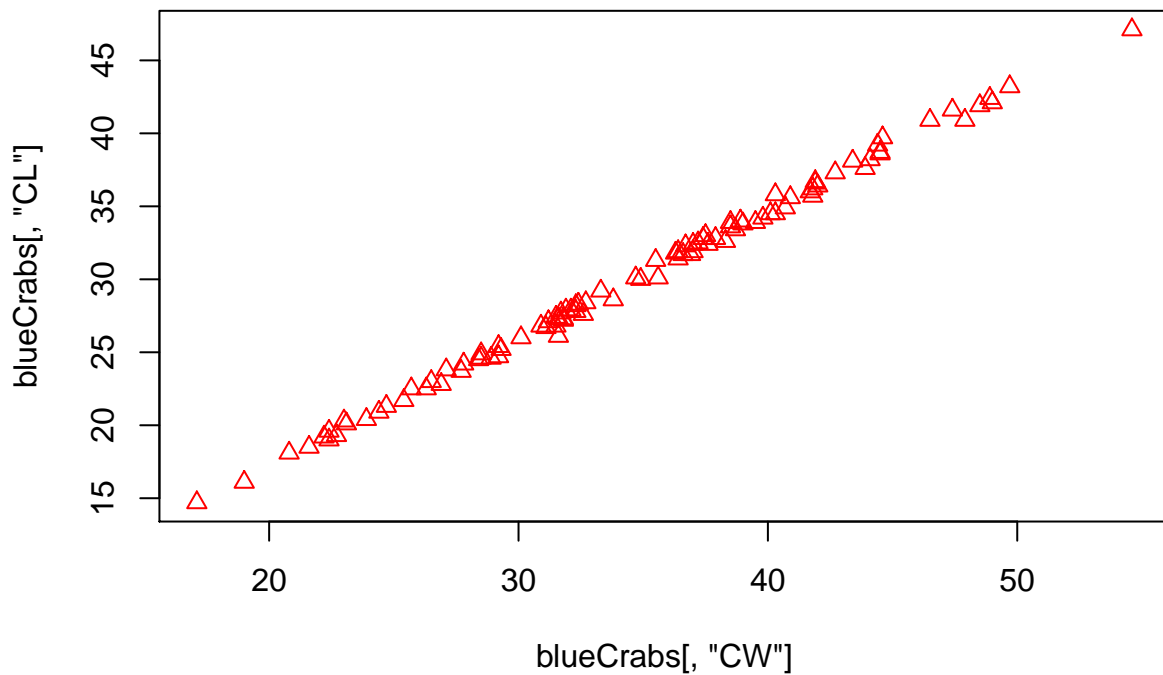

- 01b*. change the color of the points

```
plot(x = blueCrabs[ , "CW"], blueCrabs[ , "CL"], col = "red")
```
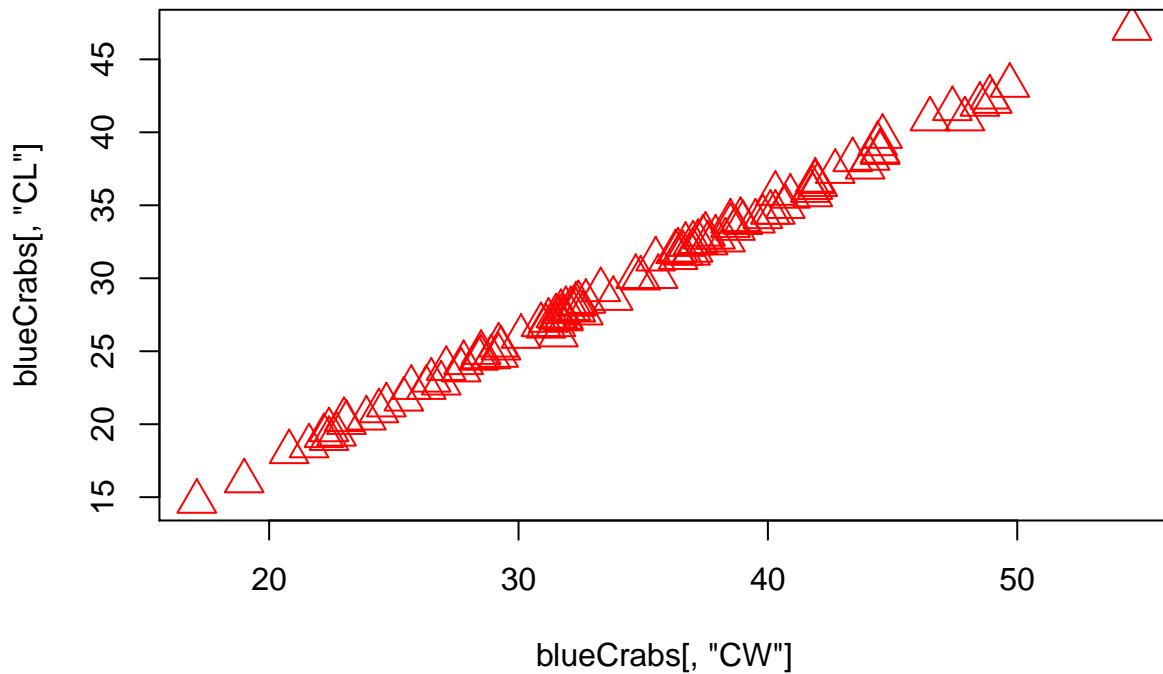
01c.change the shape of the points to a triangle

```r
plot(x = blueCrabs[ , "CW"], blueCrabs[ , "CL"], col = "red", pch = 2)
```


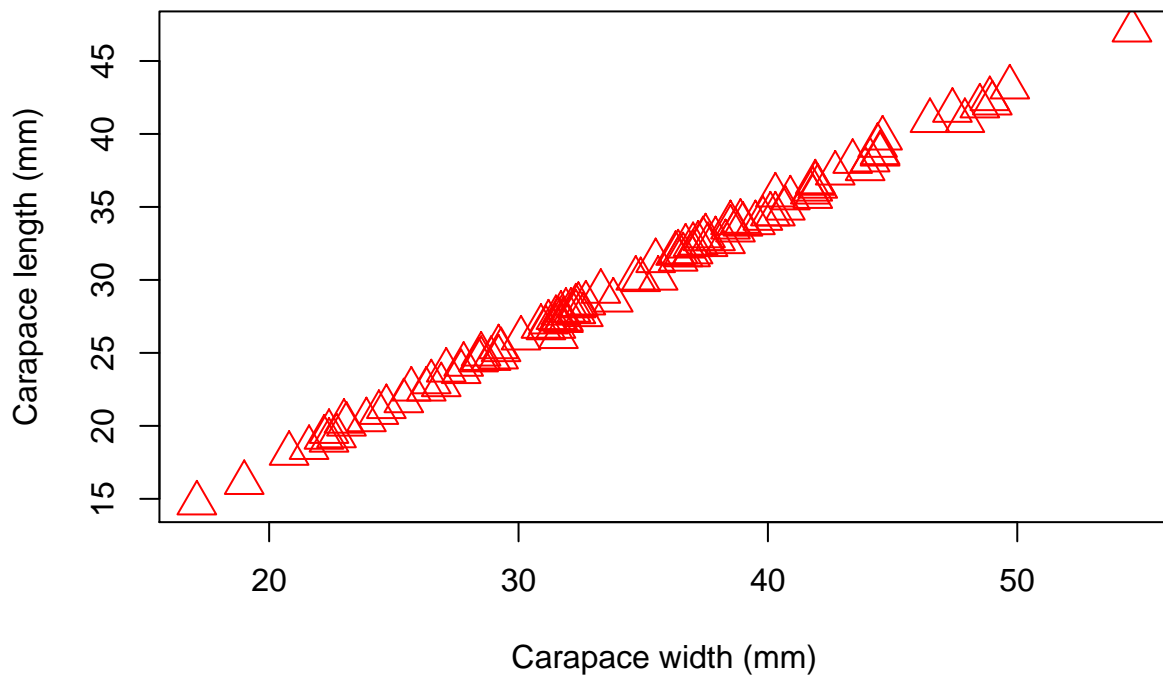
- 01d. change the size of the points

```r
plot(x = blueCrabs[ , "CW"], blueCrabs[ , "CL"], col = "red", pch = 2, cex = 2)
```
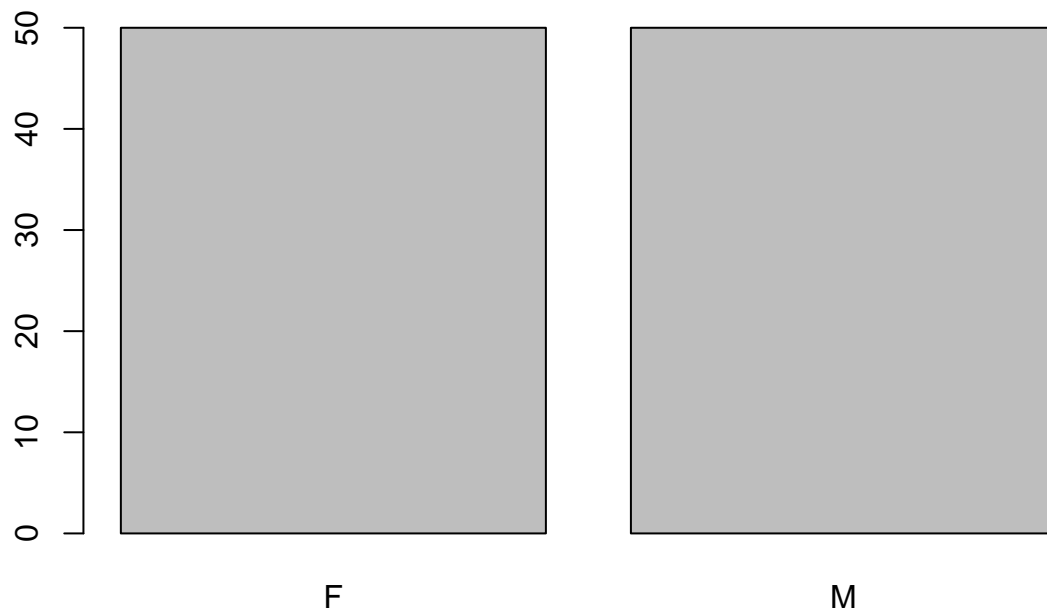
- 01e*. add a title and axis labels to the plot

```r
plot(x = blueCrabs[ , "CW"], blueCrabs[ , "CL"], col = "red", pch = 2, cex = 2, xlab = "Carapace width
```

Carapace length versus carapace width of blue crabs

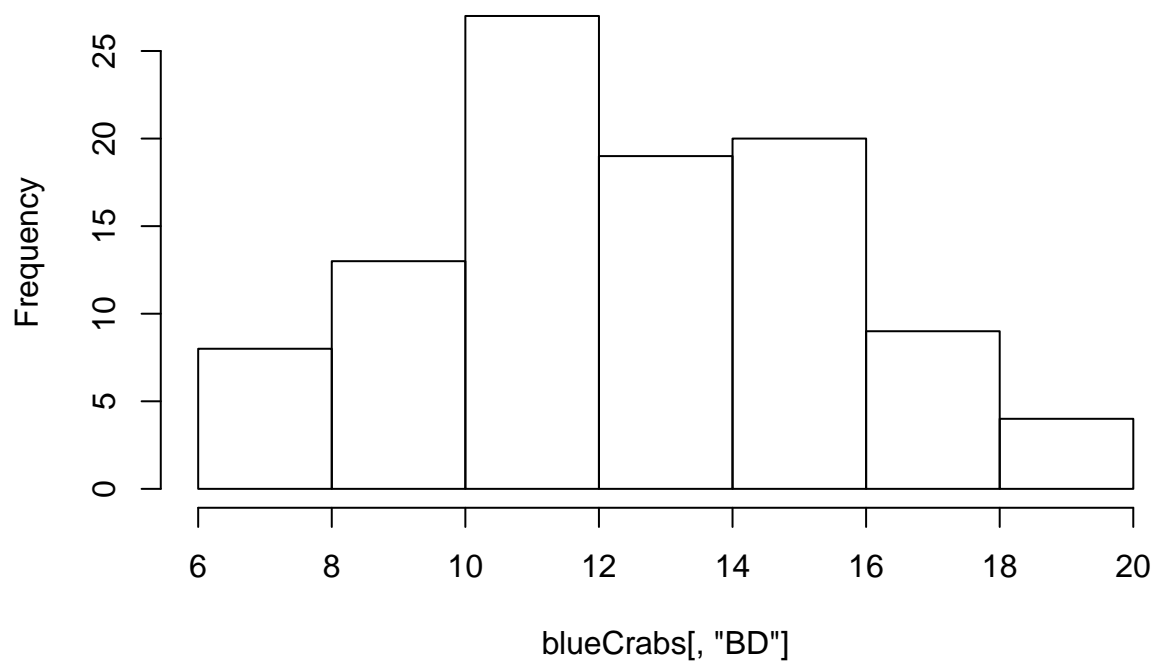**02*. make a barplot of the number of observations for each sex of blue crabs**

```r
barplot(table(blueCrabs[ , "sex"]))
```

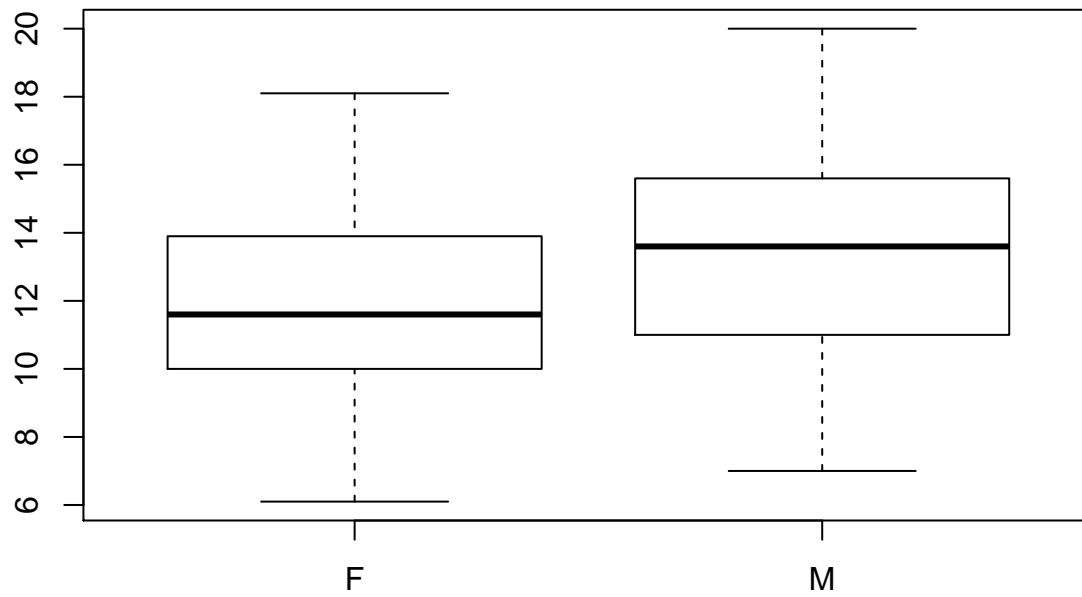**03*. make a histogram of the body depth of the blue crabs**

```
hist(blueCrabs[, "BD"])
```
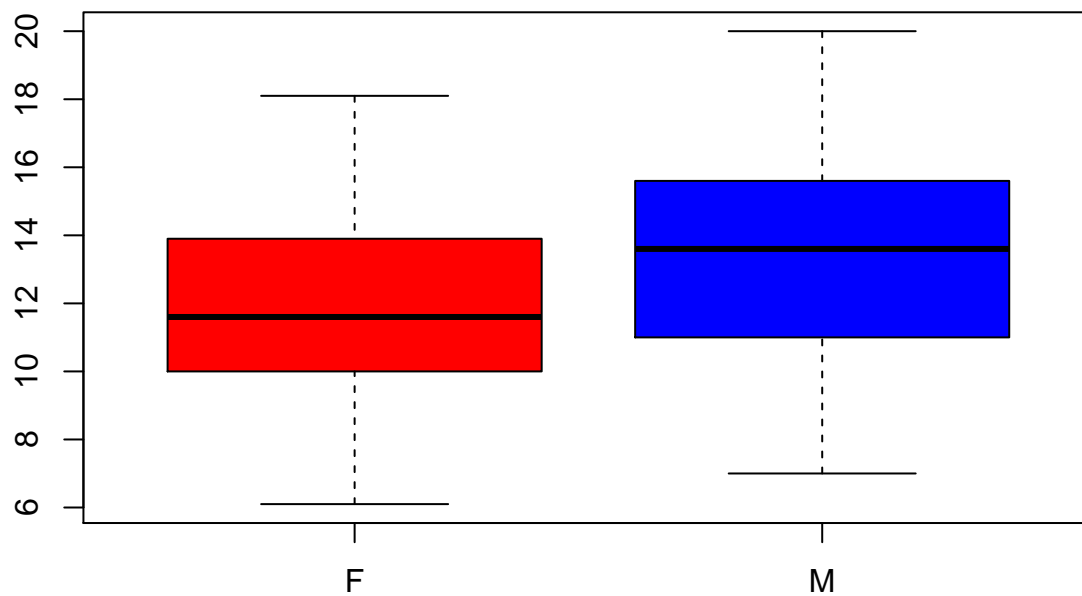
Histogram of blueCrabs[, "BD"]

04*. boxplot of body depth by sex of the blue crabs

```
boxplot(blueCrabs[ ,"BD"] ~ blueCrabs[ , "sex"])
```
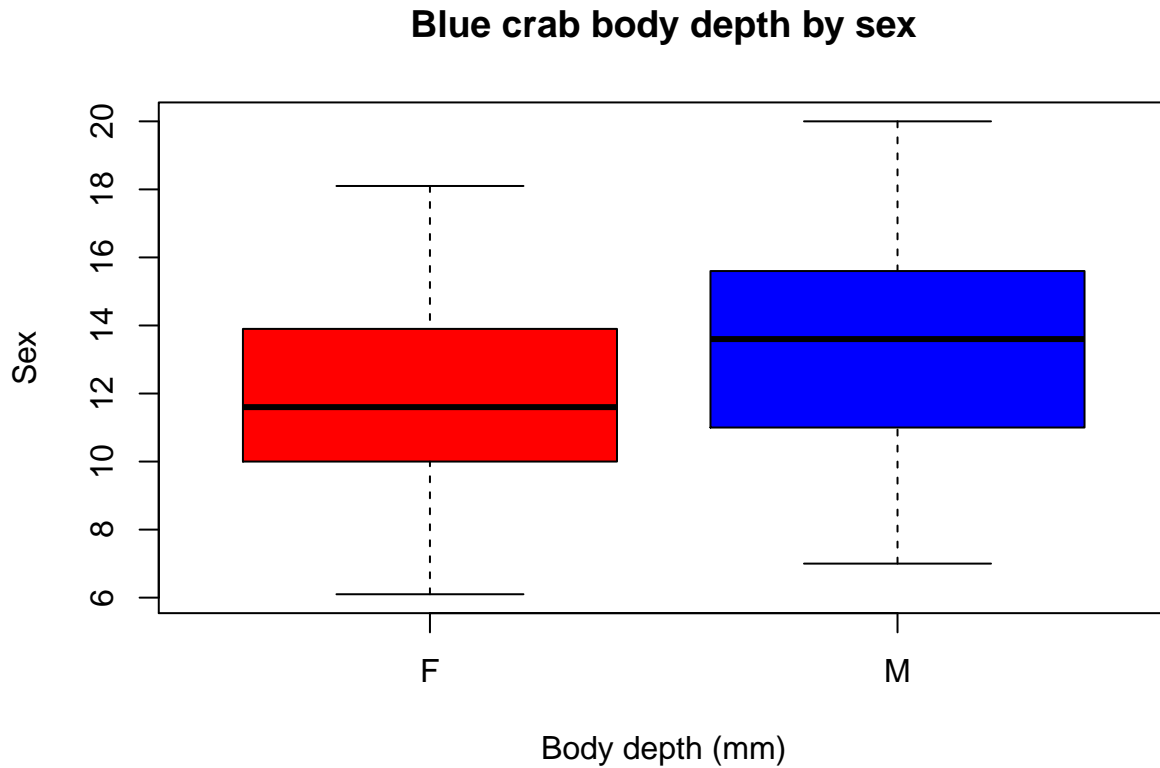
- 04a* plot this in different colors for each sex

```r
boxplot(blueCrabs[ ,"BD"] ~ blueCrabs[ , "sex"], col = c("red", "blue"))
```


- 04b add a main title and axis labels

```r
boxplot(blueCrabs[ ,"BD"] ~ blueCrabs[ , "sex"], col = c("red", "blue"), main = "Blue crab body depth by
```

Blue crab body depth by sex

**05 BONUS** - defining color variables for plotting

useful commands: [logical,]= , `ifelse()`, `plot()` + `points()`

make scatter plot for carapace length versus carapace width of the blue crabs

but now depict records of female crabs with red, and male crabs with blue

- Solution 1 — add a column of colors to the original dataset using indexing

```
blueCrabs$color = NA # add a new column to the data.frame, and assign "dummy" values for now
blueCrabs$color[blueCrabs$sex == "F"] = "red" # now assign "red" to the new column when rats are femals
blueCrabs$color[blueCrabs$se == "M"] = "blue" # now assign "blue" when they are males
# depict females and males with different colors
plot(blueCrabs$CL ~ blueCrabs$CW, col = blueCrabs$color)
```
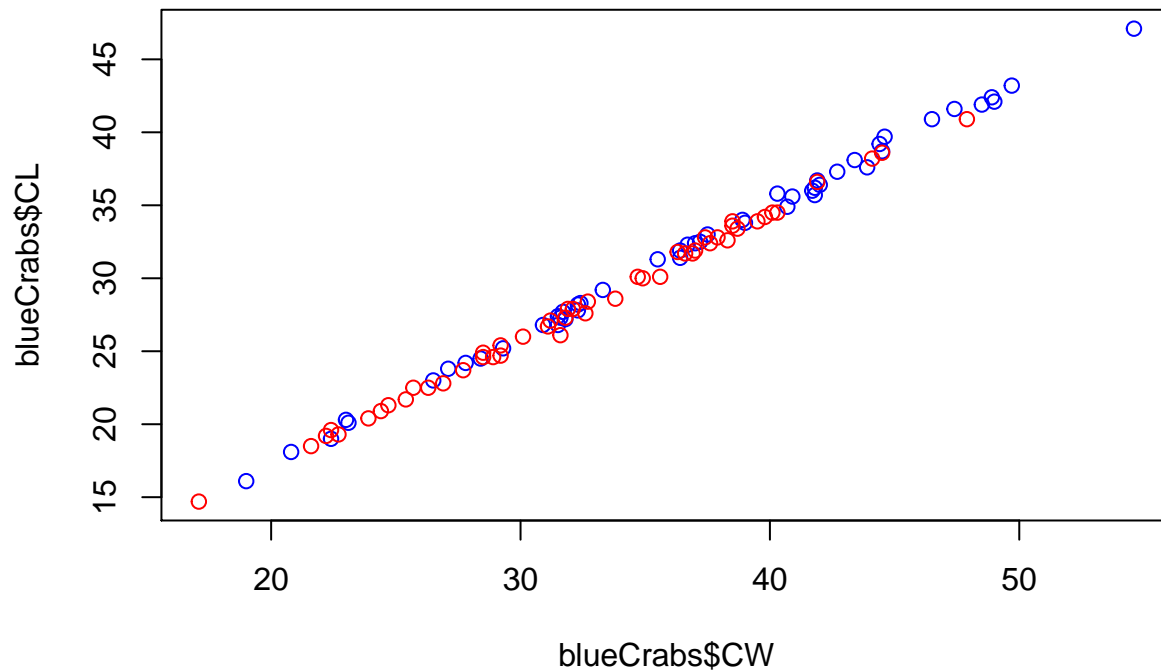
- Solution 2 – add a color column to the dataset using an "ifelse" statement

```
blueCrabs$color2 = ifelse(blueCrabs$sex == "F", "red", "blue")
# if crabs are females add "red", but if they are not females, add "blue" to the new column

# plot mass across time, and depict females and males with different colors
plot(blueCrabs$CL ~ blueCrabs$CW, col = blueCrabs$color2)
```
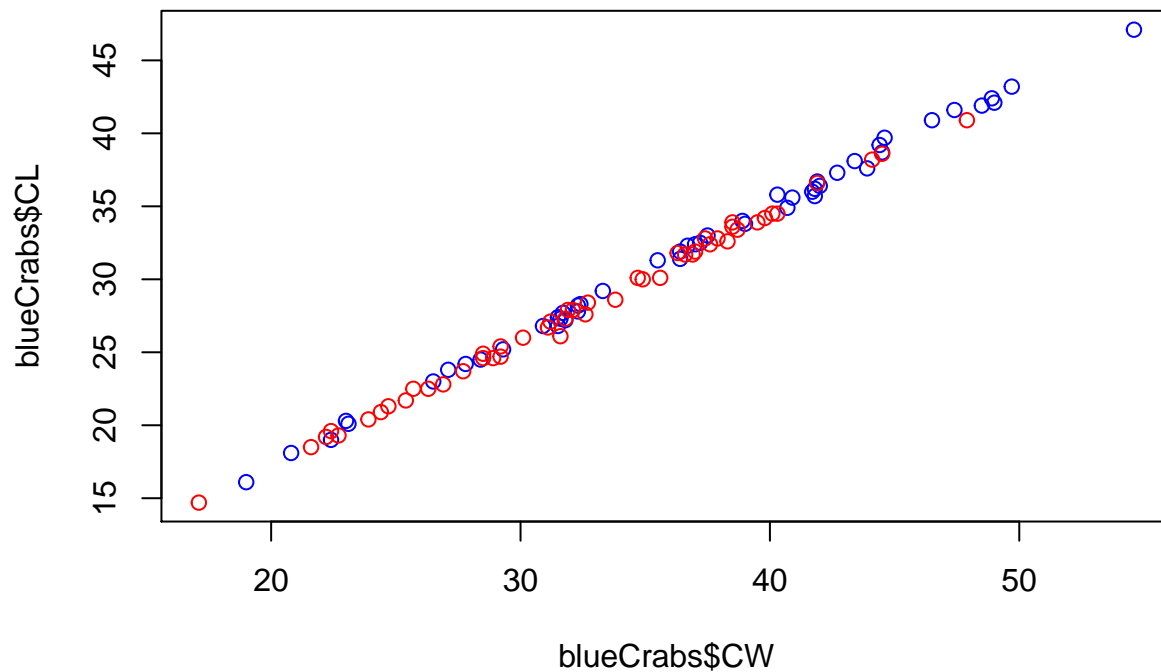

- Solution 3 — make NULL plot and add points (note: this can be a good strategy to combine with sapply for a large number of categories)

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```r
plot(blueCrabs$CL ~ blueCrabs$CW, col = NULL)
points(blueCrabs[blueCrabs$sex == "F", "CW"], blueCrabs[blueCrabs$sex == "F", "CL"], col = "red")
points(blueCrabs[blueCrabs$sex == "M", "CW"], blueCrabs[blueCrabs$sex == "M", "CL"], col = "blue")
```