

# CS513 HW2: EDA

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1)

I)

```
rm(list=ls())
data = read.csv("breast-cancer-wisconsin.csv")
data$F6 <- suppressWarnings(as.numeric(data$F6))
summary(data)
```

```
##      Sample      F1      F2      F3
## Min.   : 61634   Min.   : 1.000   Min.   : 1.000   Min.   : 1.000
## 1st Qu.: 870688   1st Qu.: 2.000   1st Qu.: 1.000   1st Qu.: 1.000
## Median : 1171710   Median : 4.000   Median : 1.000   Median : 1.000
## Mean   : 1071704   Mean    : 4.418   Mean    : 3.134   Mean    : 3.207
## 3rd Qu.: 1238298   3rd Qu.: 6.000   3rd Qu.: 5.000   3rd Qu.: 5.000
## Max.   :13454352   Max.    :10.000   Max.    :10.000   Max.    :10.000
##
##      F4      F5      F6      F7
## Min.   : 1.000   Min.   : 1.000   Min.   : 1.000   Min.   : 1.000
## 1st Qu.: 1.000   1st Qu.: 2.000   1st Qu.: 1.000   1st Qu.: 2.000
## Median : 1.000   Median : 2.000   Median : 1.000   Median : 3.000
## Mean   : 2.807   Mean    : 3.216   Mean    : 3.545   Mean    : 3.438
## 3rd Qu.: 4.000   3rd Qu.: 4.000   3rd Qu.: 6.000   3rd Qu.: 5.000
## Max.   :10.000   Max.    :10.000   Max.    :10.000   Max.    :10.000
##
##      F8      F9      Class
## Min.   : 1.000   Min.   : 1.000   Min.   :2.00
## 1st Qu.: 1.000   1st Qu.: 1.000   1st Qu.:2.00
## Median : 1.000   Median : 1.000   Median :2.00
## Mean   : 2.867   Mean    : 1.589   Mean    :2.69
## 3rd Qu.: 4.000   3rd Qu.: 1.000   3rd Qu.:4.00
## Max.   :10.000   Max.    :10.000   Max.    :4.00
##
##      NA's :16
```

II)

```
data[!complete.cases(data), ]
```

```
##      Sample F1 F2 F3 F4 F5 F6 F7 F8 F9 Class
## 24  1057013  8  4  5  1  2 NA  7  3  1     4
## 41  1096800  6  6  6  9  6 NA  7  8  1     2
## 140 1183246  1  1  1  1  1 NA  2  1  1     2
## 146 1184840  1  1  3  1  2 NA  2  1  1     2
## 159 1193683  1  1  2  1  3 NA  1  1  1     2
## 165 1197510  5  1  1  1  2 NA  3  1  1     2
```

```
## 236 1241232 3 1 4 1 2 NA 3 1 1 2
## 250 169356 3 1 1 1 2 NA 3 1 1 2
## 276 432809 3 1 3 1 2 NA 2 1 1 2
## 293 563649 8 8 8 1 2 NA 6 10 1 4
## 295 606140 1 1 1 1 2 NA 2 1 1 2
## 298 61634 5 4 3 1 2 NA 2 3 1 2
## 316 704168 4 6 5 6 7 NA 4 9 1 2
## 322 733639 3 1 1 1 2 NA 3 1 1 2
## 412 1238464 1 1 1 1 1 NA 2 1 1 2
## 618 1057067 1 1 1 1 1 NA 1 1 1 2
```

III)

```
data$F6[is.na(data$F6)] <- mean(data$F6, na.rm=TRUE)
```

IV)

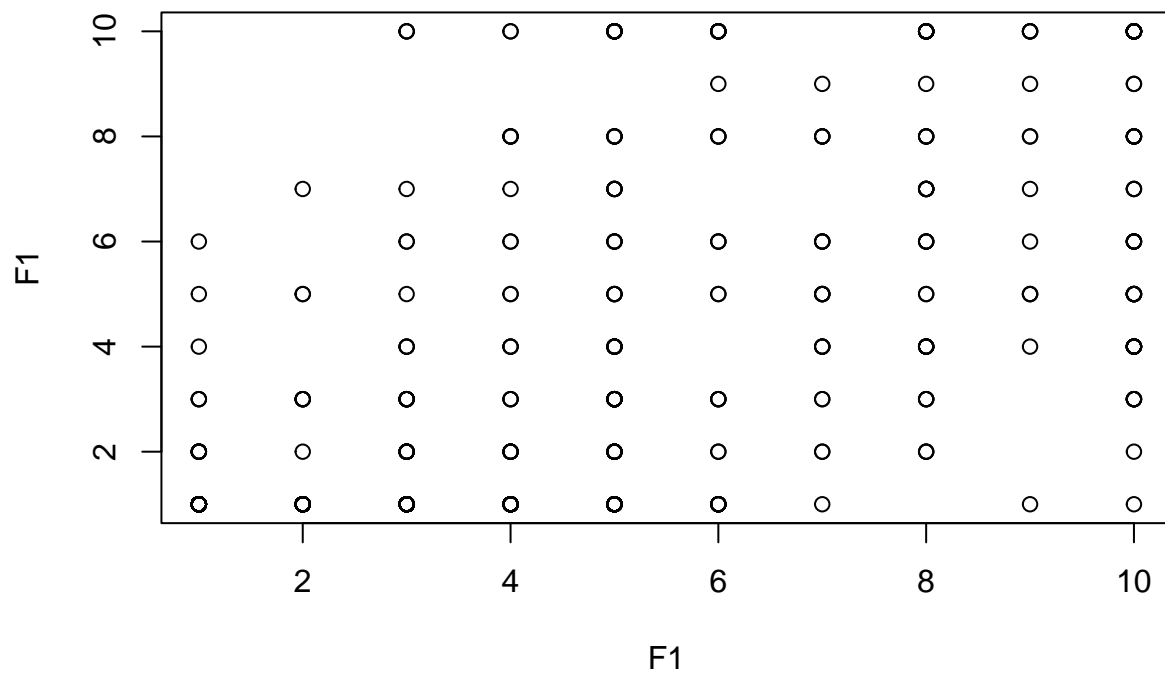
```
table(data$Class, data$F6)
```

```
##
##      1    2    3 3.54465592972182    4    5    6    7    8    9   10
##  2 387   21   14                   14    6   10    0    1    2    0    3
##  4   15    9   14                   2   13   20    4    7   19    9  129
```

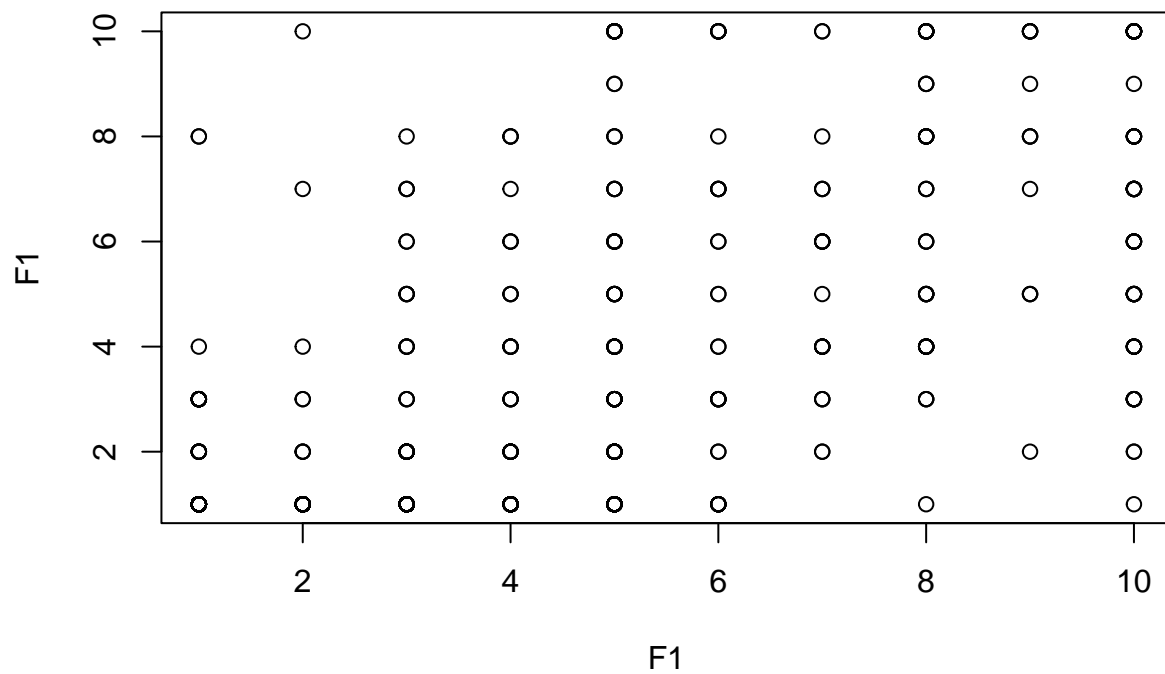
V)

```
for (i in 1:5) {
  for (j in (i+1):6){
    f = paste("F",i,sep='')
    g = paste("F",j,sep='')
    plot(data[[f]],
          data[[g]],
          main=paste("Scatterplot of F",i," and F",j,sep=''),
          xlab=paste("F",i,sep=''),
          ylab=paste("F",j,sep=''))
  }
}
```

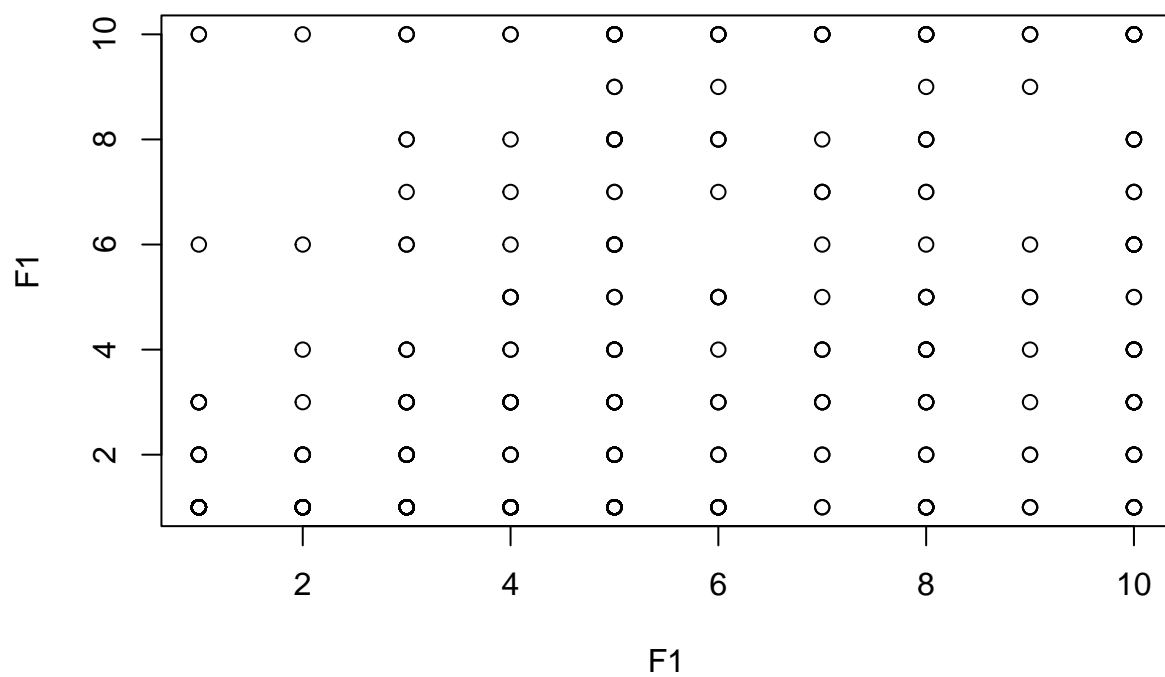
**Scatterplot of F1 and F2**



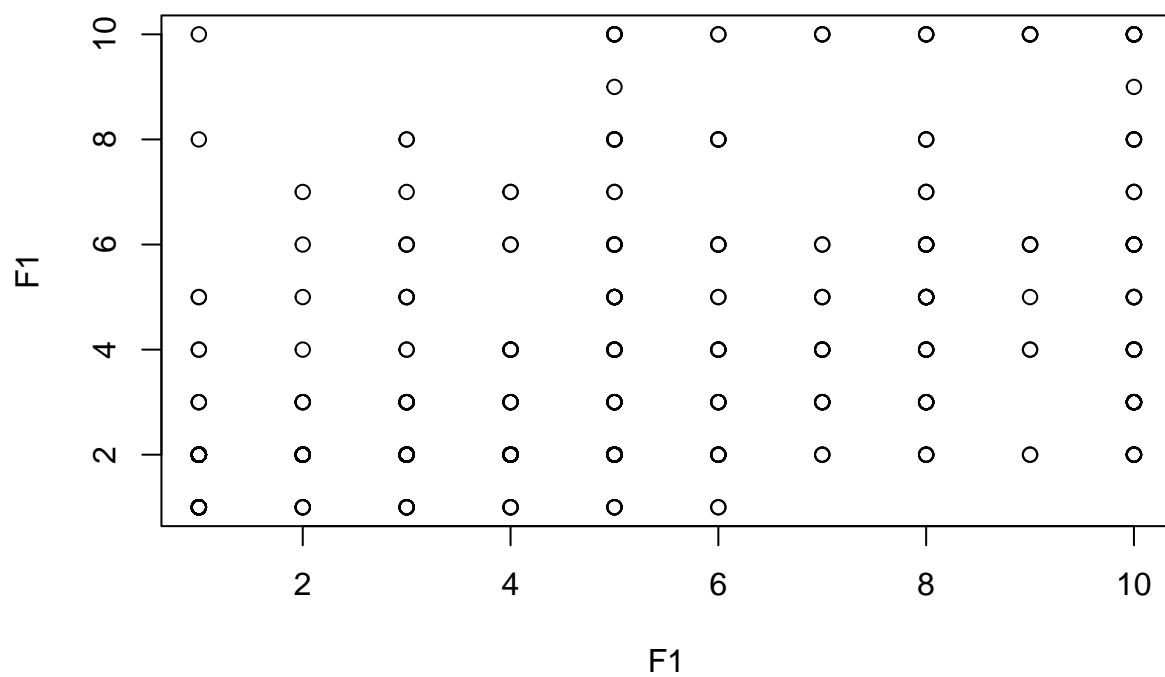
**Scatterplot of F1 and F3**



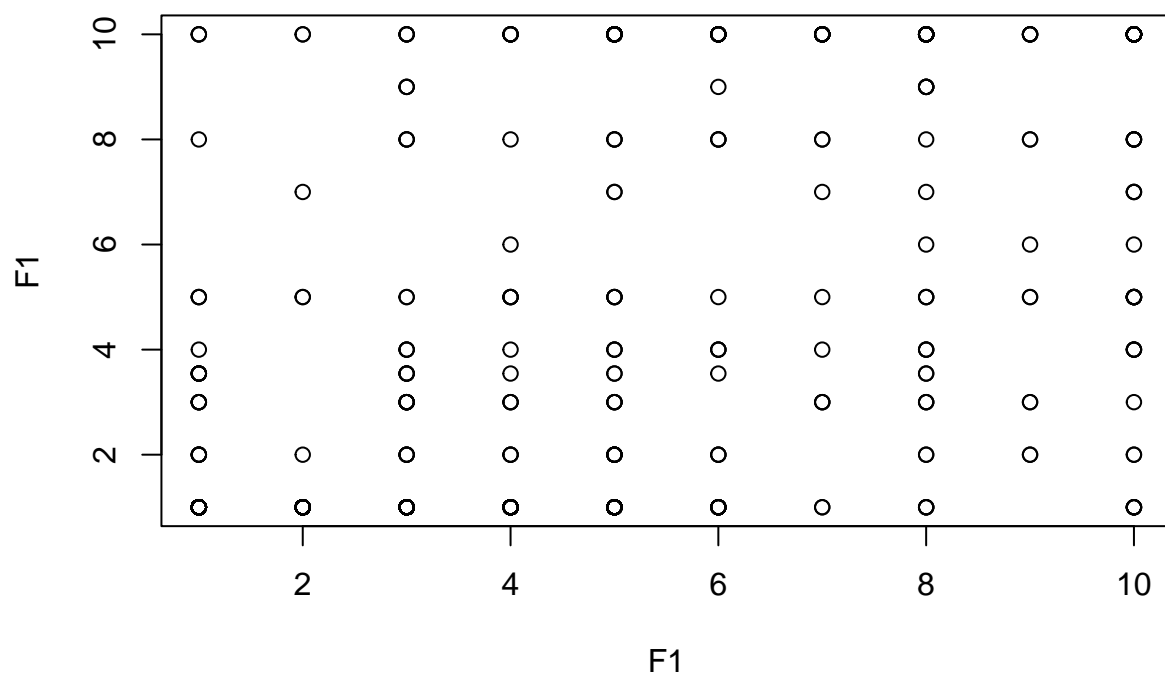
**Scatterplot of F1 and F4**



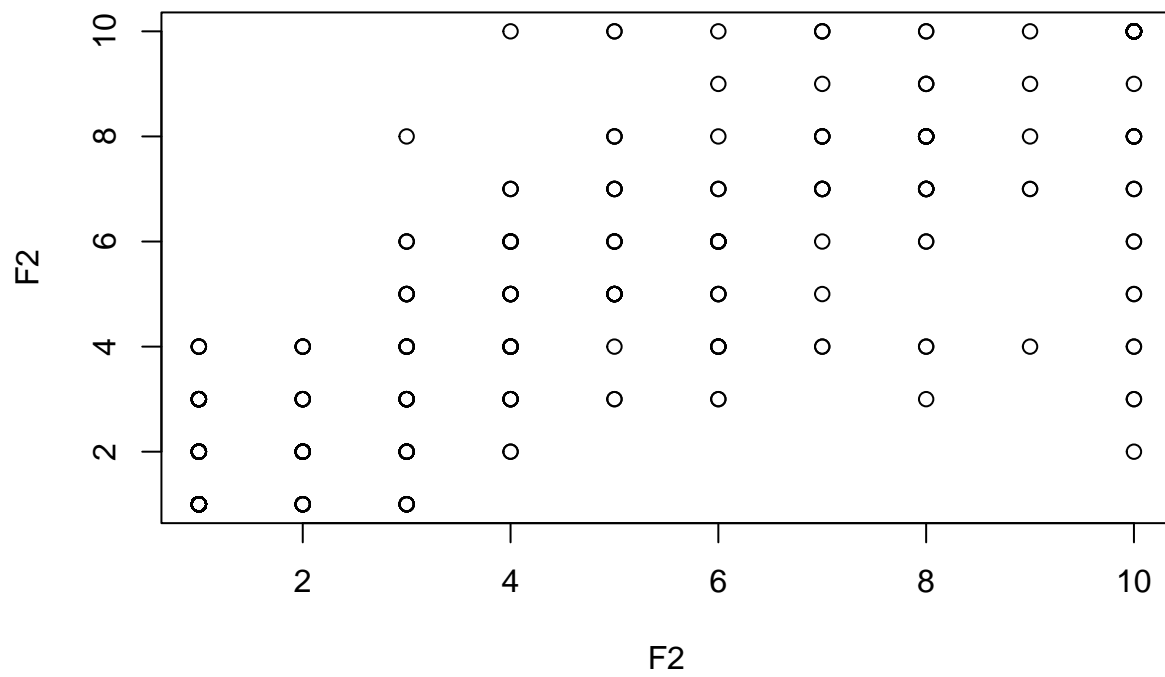
Scatterplot of F1 and F5



Scatterplot of F1 and F6

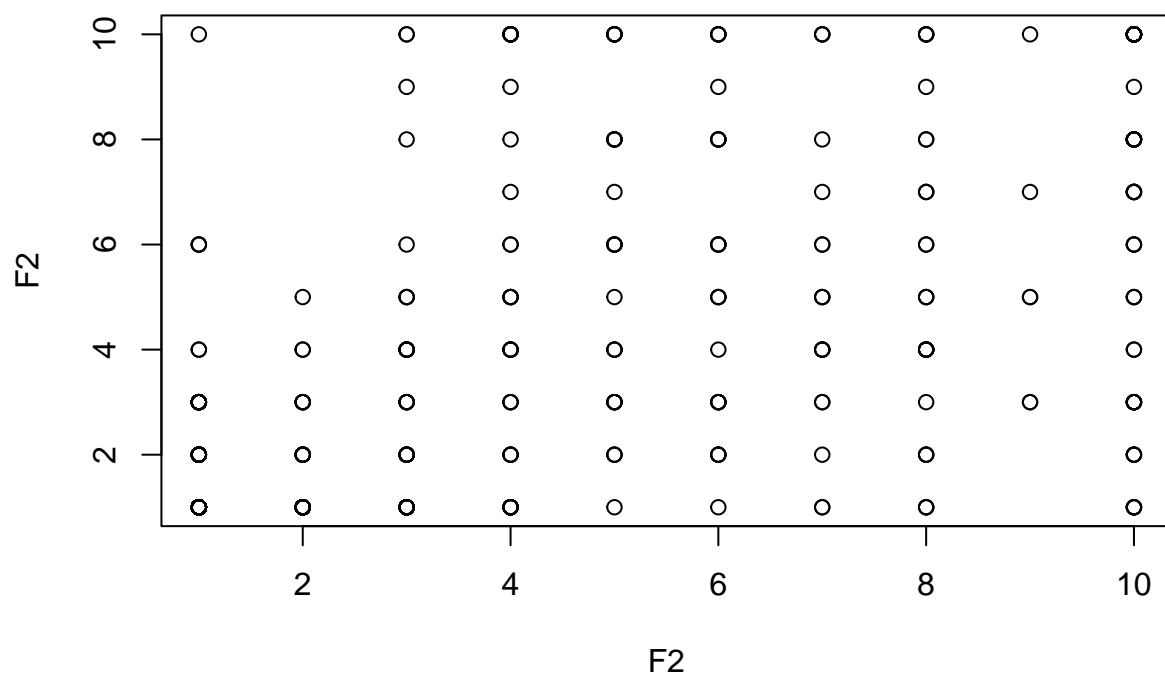


**Scatterplot of F2 and F3**

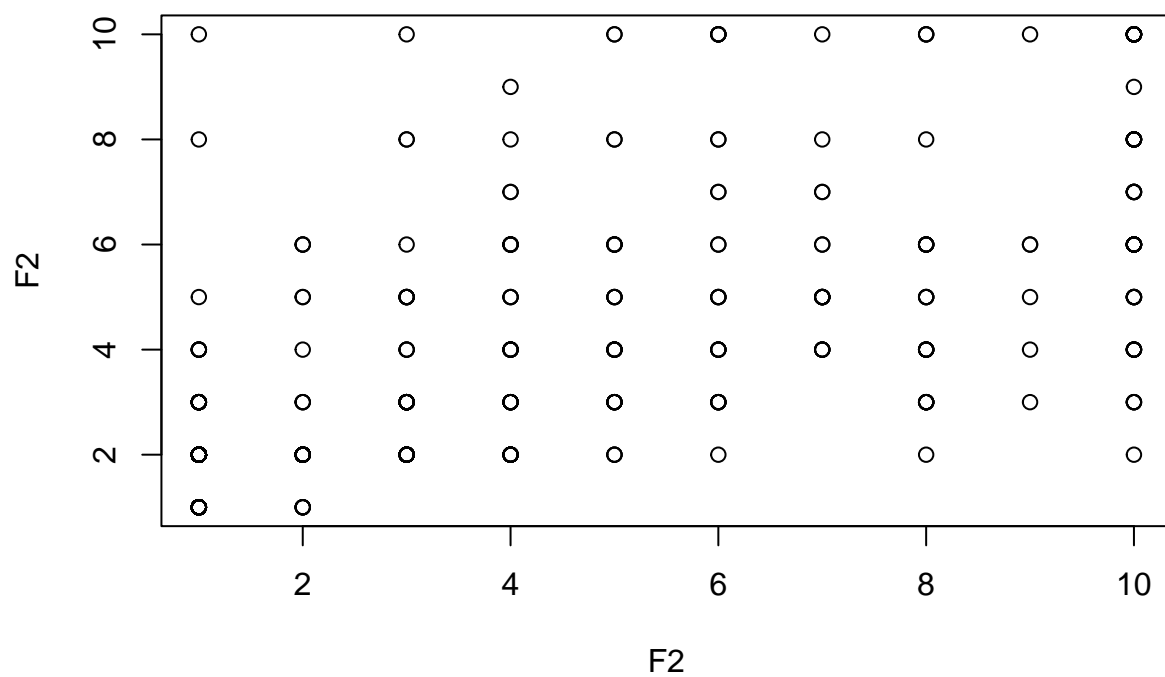




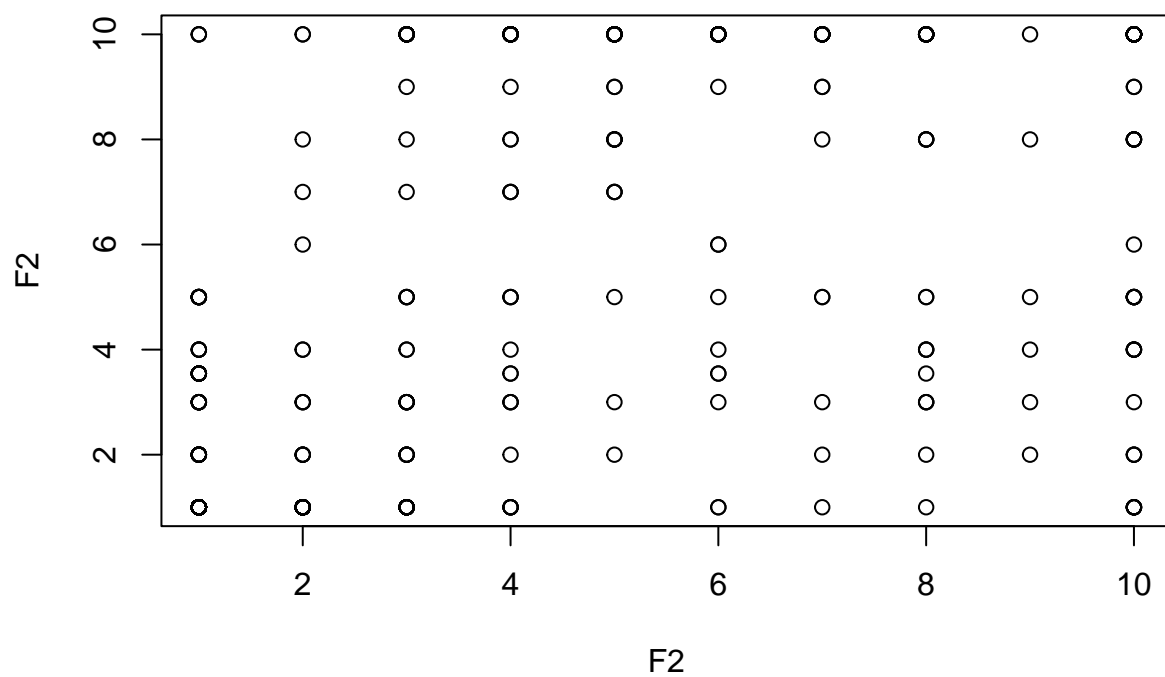
**Scatterplot of F2 and F4**



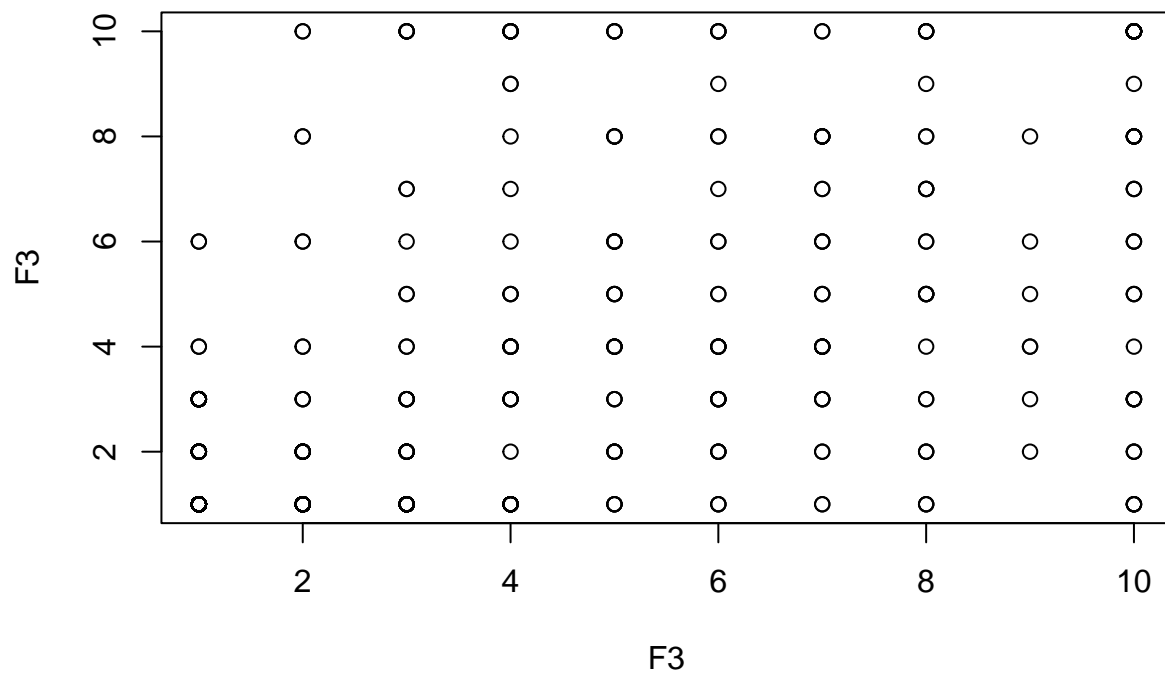
**Scatterplot of F2 and F5**



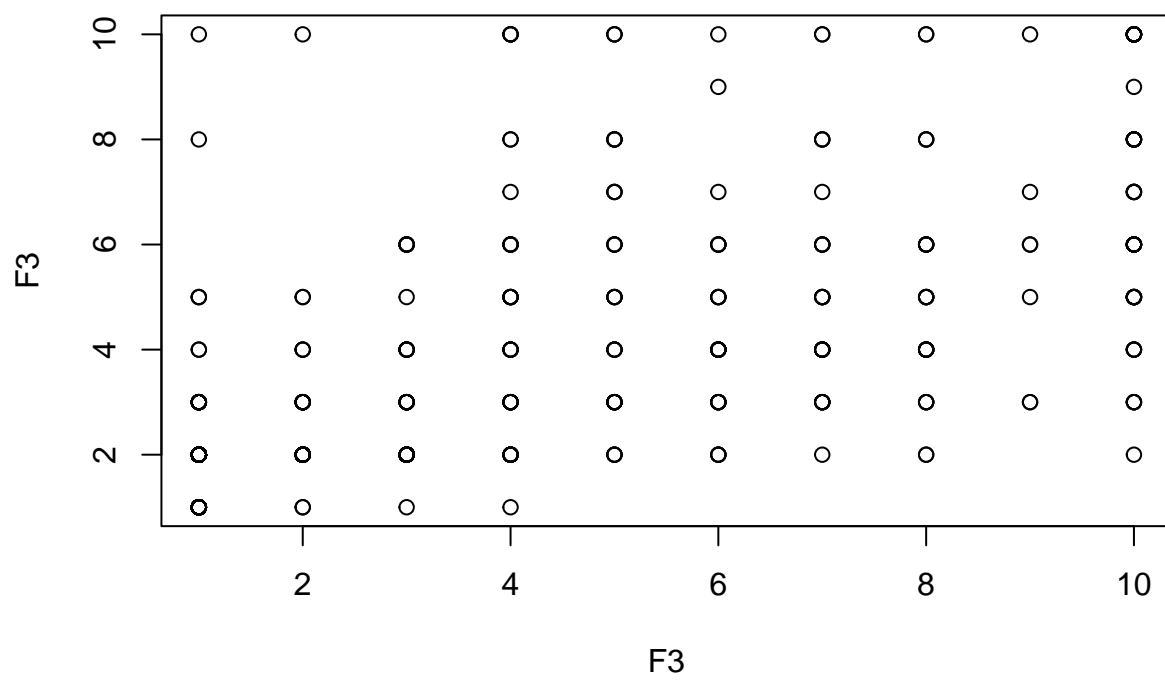
Scatterplot of F2 and F6



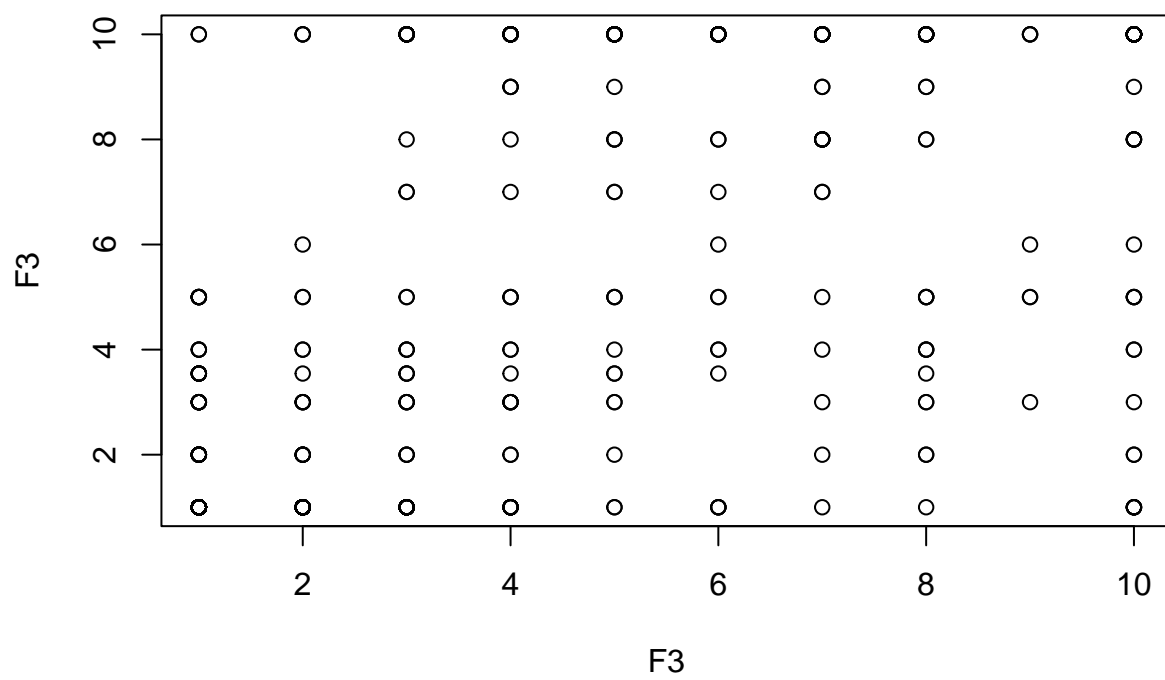
**Scatterplot of F3 and F4**



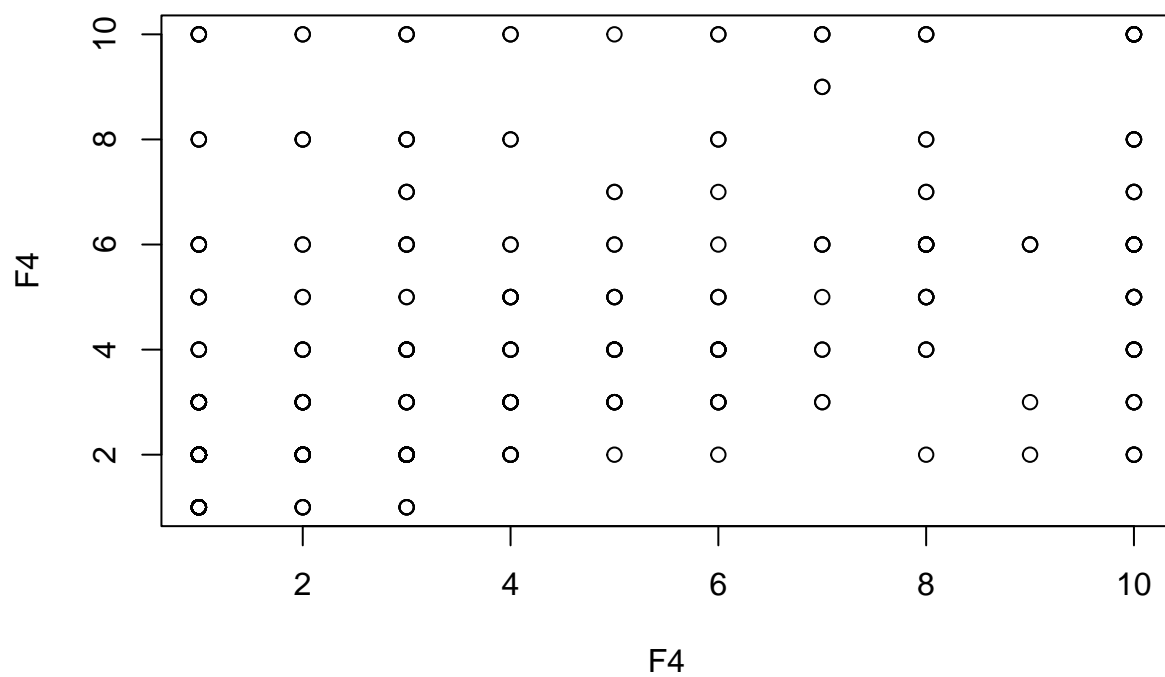
**Scatterplot of F3 and F5**



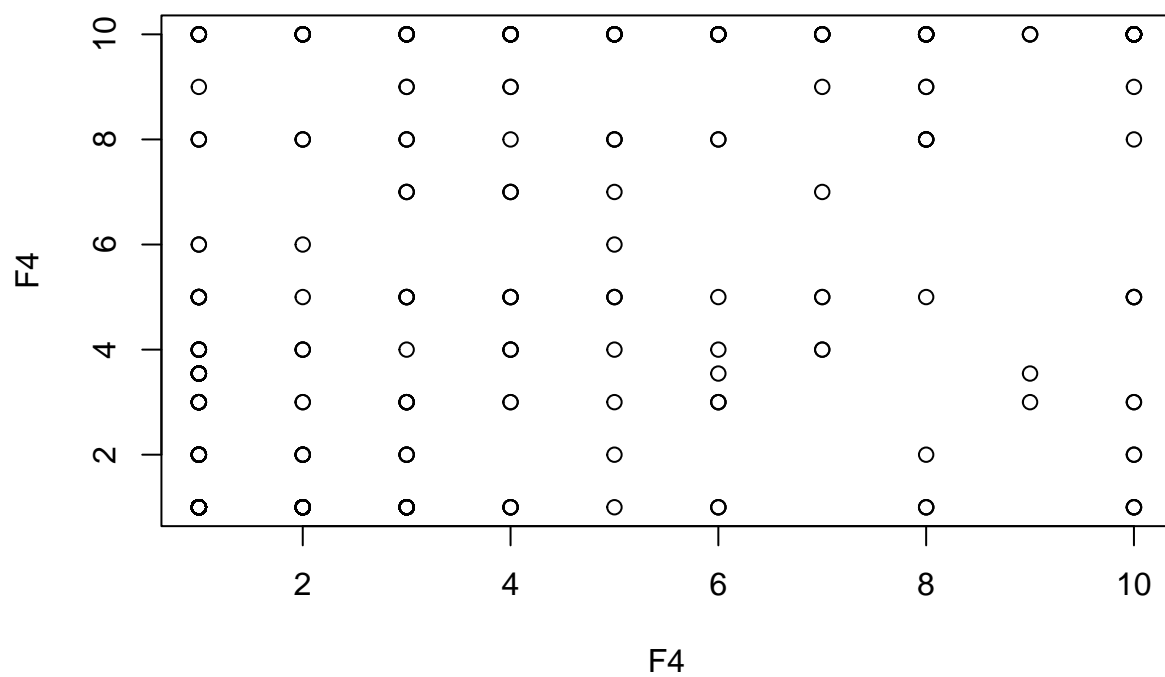
Scatterplot of F3 and F6



**Scatterplot of F4 and F5**

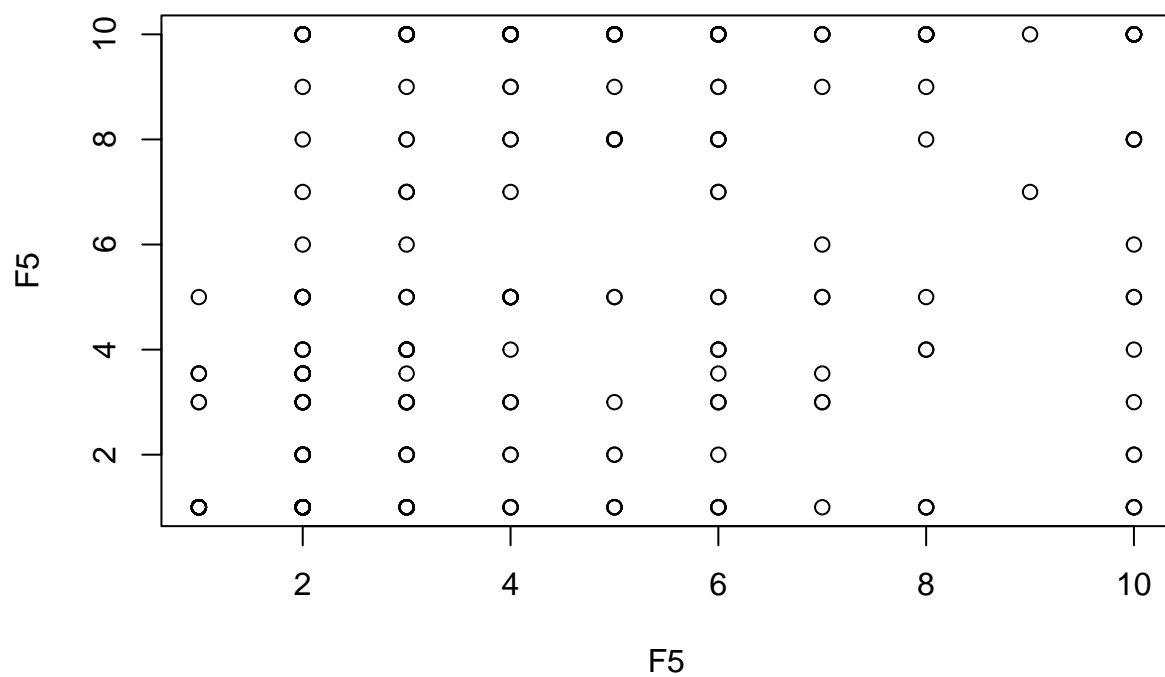


Scatterplot of F4 and F6





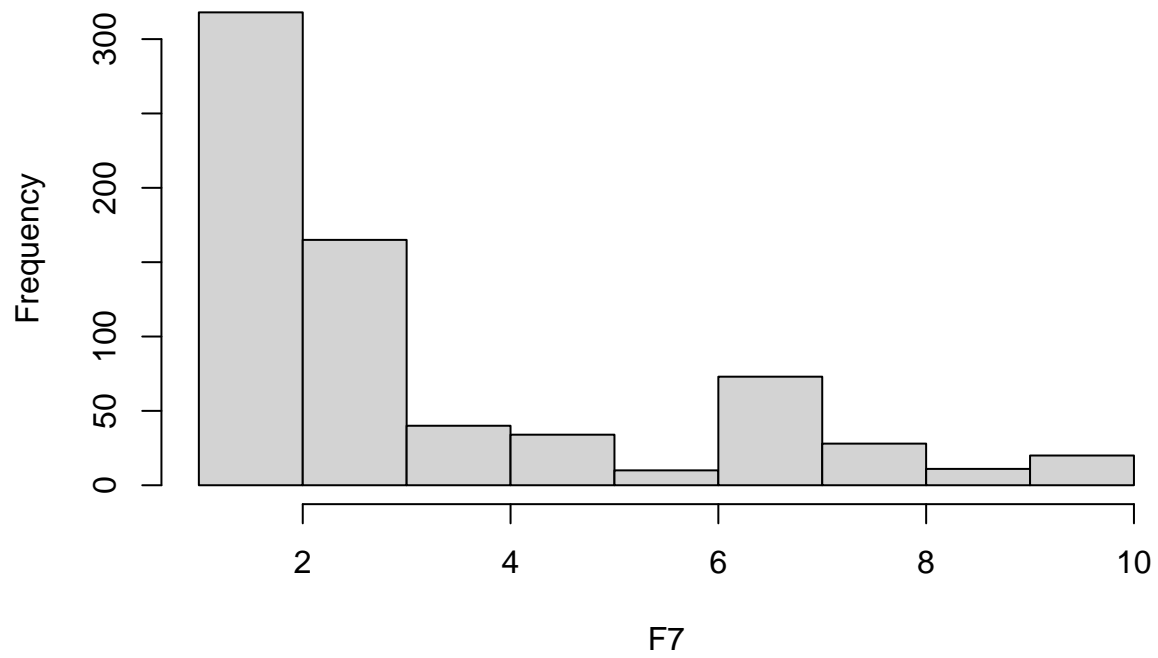
**Scatterplot of F5 and F6**



VI)

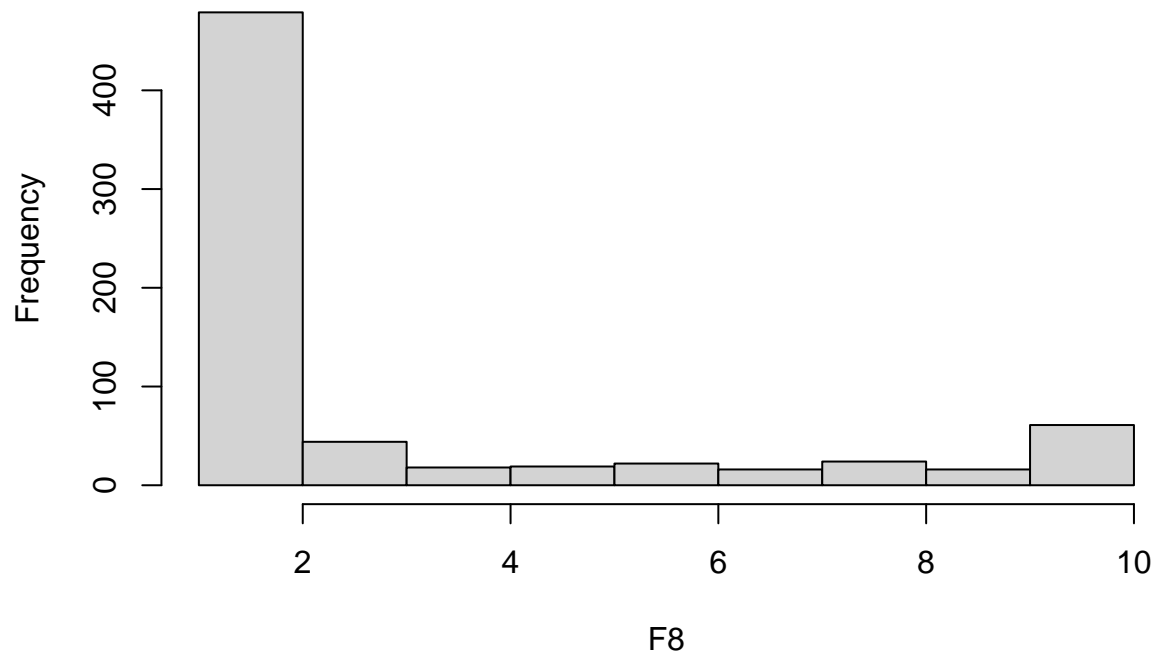
```
hist(data$F7, main="Histogram of F7", xlab="F7")
```

**Histogram of F7**



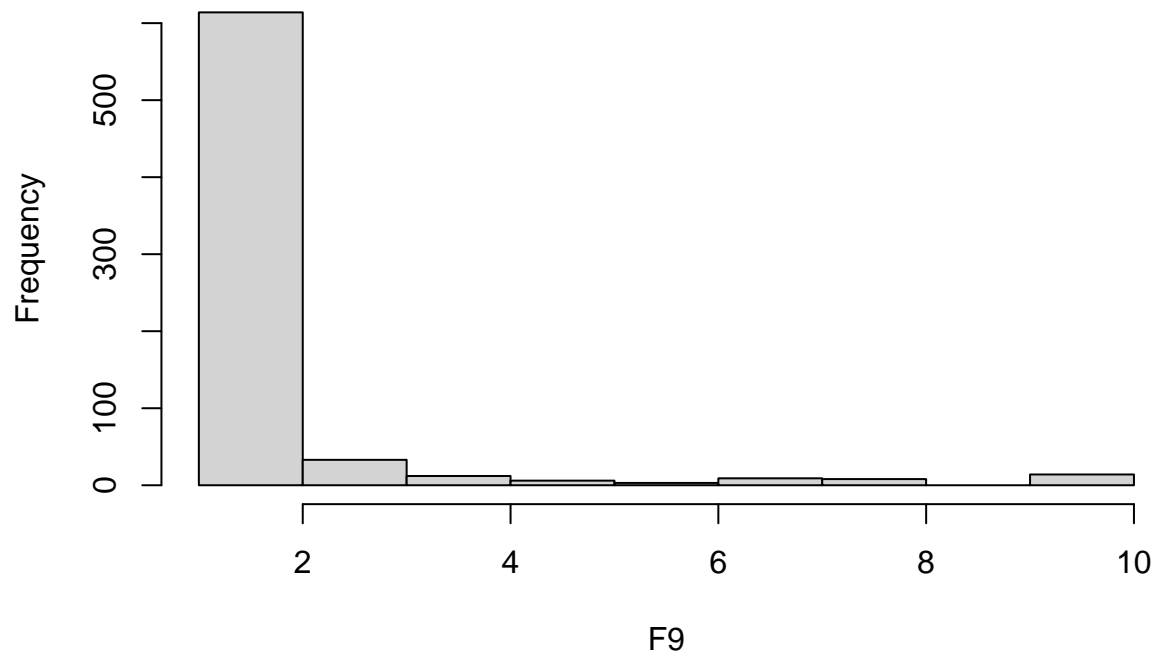
```
hist(data$F8, main="Histogram of F8", xlab="F8")
```

**Histogram of F8**



```
hist(data$F9, main="Histogram of F9", xlab="F9")
```

## Histogram of F9



2)

```
rm(list=ls())  
data = read.csv("breast-cancer-wisconsin.csv")  
data = data[complete.cases(data), ]
```