574_HW2

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```
  library(Hotelling)
```

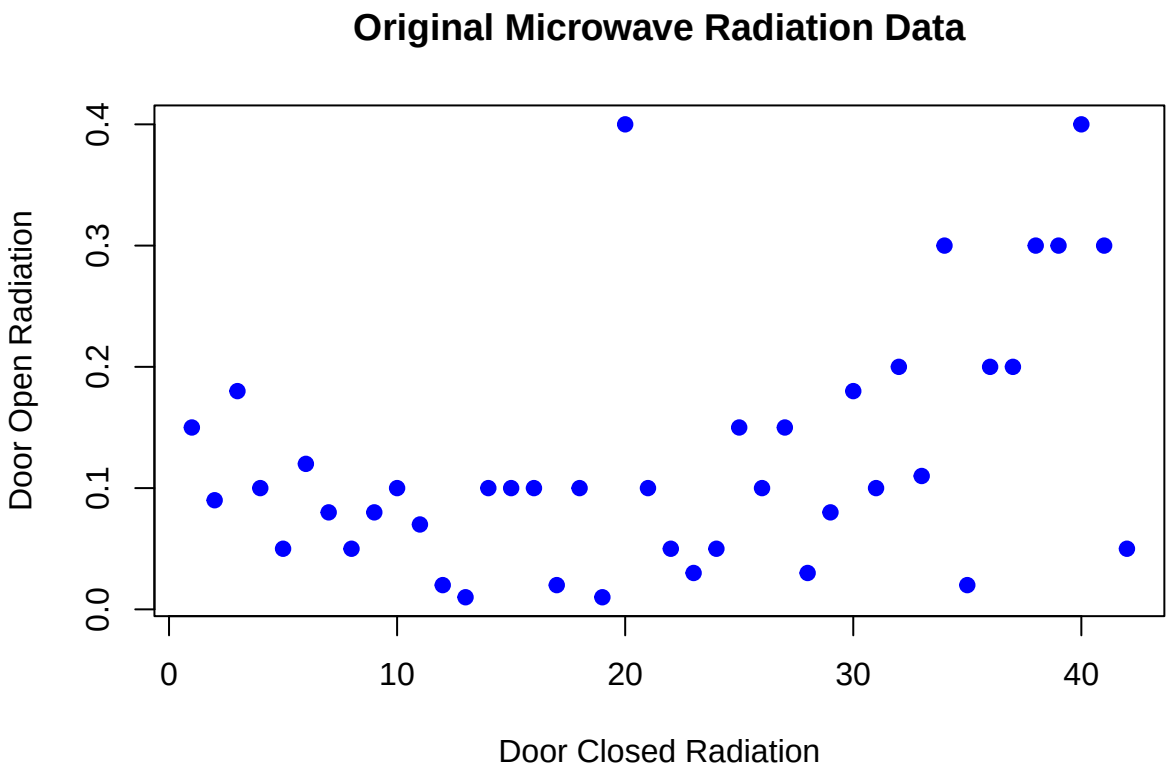
```
## Loading required package: corpcor
```

```
  library(car)
```

```
## Loading required package: carData
```

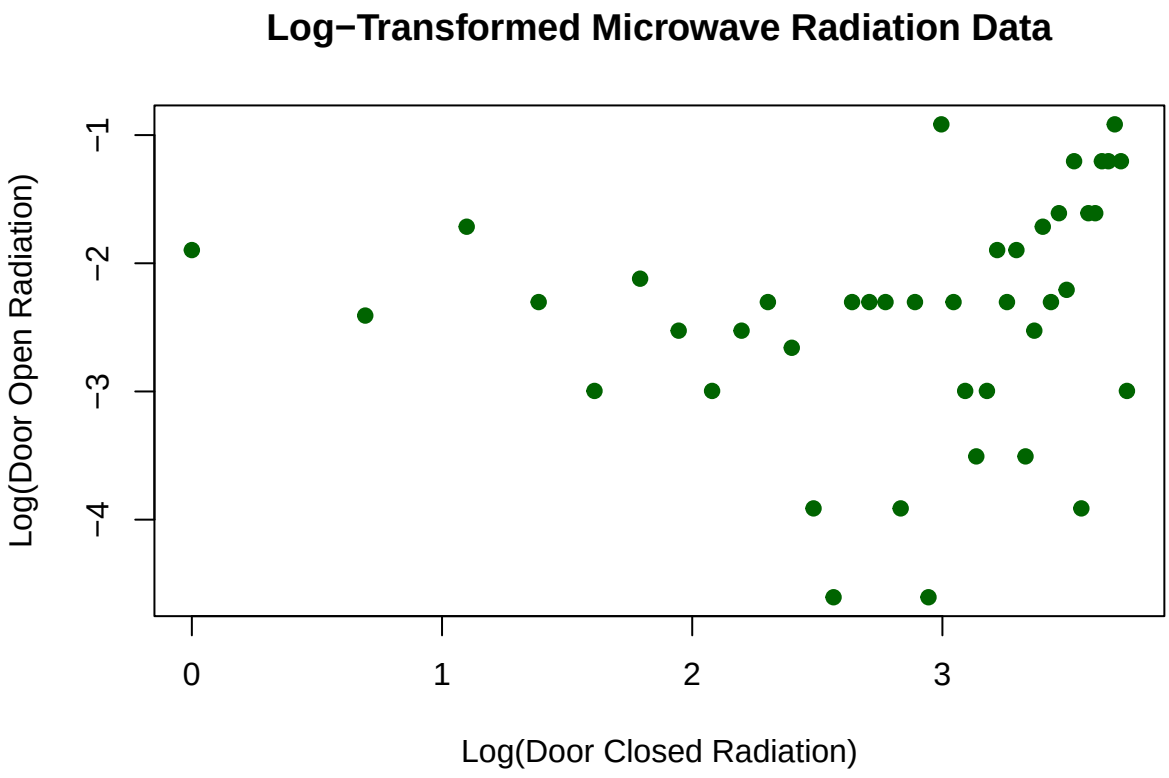
```
load("Data/microwave.RData")

plot(microwave,
     main = "Original Microwave Radiation Data",
     xlab = "Door Closed Radiation",
     ylab = "Door Open Radiation",
     pch = 19, col = "blue")
```




```
log_microwave <- as.matrix(log(microwave))

plot(log_microwave,
     main = "Log-Transformed Microwave Radiation Data",
     xlab = "Log(Door Closed Radiation)",
     ylab = "Log(Door Open Radiation)",
     pch = 19, col = "darkgreen")
```




```
mu0_original <- c(0.07, 0.10)
# Transform the null mean to the log scale:
mu0_log <- log(mu0_original)

y <- matrix(mu0_log,
            nrow = nrow(log_microwave),
            ncol = ncol(log_microwave),
            byrow = TRUE)


htest_result <- hotelling.test(x = log_microwave, y = y)
print(htest_result)
```

```
## Test stat:  1472.2
## Numerator df:  3
## Denominator df:  80
## P-value:  0
```

```
mean_log <- colMeans(log_microwave)

dataEllipse(log_microwave[, 1], log_microwave[, 2],
            levels = 0.95,
            center.pch = 19, center.cex = 1.2,
            xlab = "Log(Door Closed Radiation)",
            ylab = "Log(Door Open Radiation)",
```

```
           main = "95% Confidence Ellipse for Mean (Log Scale)")
points(mean_log[1], mean_log[2], pch = 19, col = "red")
```