

A38__Hoermann

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Power of R

```
library(data.table)

data = data.table(x = c(122, 120, 123, 126, 124),
                  y = c(114, 125, 121, 127, 128),
                  z = c(118, 129, 131, 135, 137))

data

##      x    y    z
## 1: 122 114 118
## 2: 120 125 129
## 3: 123 121 131
## 4: 126 127 135
## 5: 124 128 137

dataforanova = c(data$x,data$y,data$z)
groups = factor(rep(c("x", "y", "z"), each = 5))
groups
```

```
## [1] x x x x x y y y y z z z z z
## Levels: x y z

fit = lm(formula = dataforanova~groups)
anova(fit)
```

```
## Analysis of Variance Table
##
## Response: dataforanova
##           Df Sum Sq Mean Sq F value Pr(>F)
## groups      2 163.33  81.667   2.6486 0.1115
## Residuals  12 370.00  30.833
```

Thus don't drop H_0 .

Manual Calculation

```
dtransform = data.table(x = data$x - mean(data$x),
                        y = data$y - mean(data$y),
                        z = data$z - mean(data$z))

dtransform

##      x    y    z
## 1: -1  -9 -12
## 2: -3   2  -1
## 3:  0  -2   1
## 4:  3   4   5
## 5:  1   5   7
```

```
derror = data.table(x = dtransform$x^2,
                    y = dtransform$y^2,
                    z = dtransform$z^2)

derror
```

```
##      x y  z
## 1: 1 81 144
## 2: 9  4   1
## 3: 0  4   1
## 4: 9 16  25
## 5: 1 25  49
```

```
sserror = sum(derror)
sserror
```

```
## [1] 370
```

```
colmean = colMeans(data)
dmean = mean(colmean)
dmean
```

```
## [1] 125.3333
```

```
ssvar = (colmean - dmean)^2
ssvar = ssvar * 6
ssvar = sum(ssvar)
ssvar
```

```
## [1] 196
```

```
dfvar = 2
msvar = ssvar / dfvar
msvar
```

```
## [1] 98
```

```
dferror = 12
mserror = sserror / dferror
mserror
```

```
## [1] 30.83333
```

```
fcalc = msvar / mserror
fcalc
```

```
## [1] 3.178378
```

```
fcrit = qf(0.95, 2, 12)
fcrit
```

```
## [1] 3.885294
```

```
fcalc < fcrit
```

```
## [1] TRUE
```

Thus don't drop H0, meaning all samples stem from distribution with same variance.