ASSIGNMENT TWO: EDA

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Factorial Design

This approach takes more than factors to consider to do the experiment.

```
df3 = read.csv("fastfood-3.csv")
r = c(t(as.matrix(df3))) # response data
f1 = c("Item1", "Item2", "Item3") # 1st factor levels
f2 = c("East", "West")            # 2nd factor levels
k1 = length(f1)          # number of 1st factors
k2 = length(f2)          # number of 2nd factors
n = 4
tm1 = gl(k1, 1, n*k1*k2, factor(f1))
tm1
```

```
##  [1] Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2
## [12] Item3 Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2 Item3 Item1
## [23] Item2 Item3
## Levels: Item1 Item2 Item3
```

```
tm2 = gl(k2, n*k1, n*k1*k2, factor(f2))
tm2
```

```
##  [1] East East East East East East East East East East East East West West
## [15] West West West West West West West West West West
## Levels: East West
```

```
av = aov(r ~ tm1 * tm2)
summary(av)
```

```
##             Df Sum Sq Mean Sq F value   Pr(>F)
## tm1          2  385.1   192.5   9.554  0.00149 **
## tm2          1  715.0   715.0  35.481 1.23e-05 ***
## tm1:tm2      2  234.1   117.0   5.808  0.01132 *
## Residuals   18  362.7    20.2
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Randomized Block Design

Here, this design only takes one primary factor to consider for the experimant. Each variable is tested against all treatments.

```
df2 = read.table("fastfood-2.txt", header=TRUE); df2
```

```
##   Item1 Item2 Item3
## 1    31    27    24
## 2    31    28    31
## 3    45    29    46
## 4    21    18    48
```

```
## 5    42    36    46
## 6    32    17    40
```

```
r = c(t(as.matrix(df2))) # response data
r
```

```
##  [1] 31 27 24 31 28 31 45 29 46 21 18 48 42 36 46 32 17 40
```

```
f = c("Item1", "Item2", "Item3")   # treatment levels
k = 3                              # number of treatment levels
n = 6                              # number of control blocks


tm = gl(k, 1, n*k, factor(f))   # matching treatment
tm
```

```
##  [1] Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2
## [12] Item3 Item1 Item2 Item3 Item1 Item2 Item3
## Levels: Item1 Item2 Item3
```

```
blk = gl(n, k, k*n)             # blocking factor
blk
```

```
##  [1] 1 1 1 2 2 2 3 3 3 4 4 4 5 5 5 6 6 6
## Levels: 1 2 3 4 5 6
```

```
av = aov(r ~ tm + blk)

summary(av)
```

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## tm           2  538.8  269.39   4.959 0.0319 *
## blk          5  559.8  111.96   2.061 0.1547
## Residuals   10  543.2   54.32
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

Completely Randomaized Design

Similarly, there is only one primary factor to consider; however, the test subjects are assigned to treament levels of the primary factor at random.

```
df1 = read.table("fastfood-1.txt", header=TRUE); df1
```

```
##   Item1 Item2 Item3
## 1    22    52    15
## 2    42    33    24
## 3    44     8    19
## 4    52    47    18
## 5    45    43    34
## 6    37    32    39
```

```
r = c(t(as.matrix(df1))) # response data
r
```

```
##  [1] 22 52 15 42 33 24 44  8 19 52 47 18 45 43 34 37 32 39
```

```
f = c("Item1", "Item2", "Item3")   # treatment levels
k = 3                              # number of treatment levels
```

```r
n = 6                     # observations per treatment

tm = gl(k, 1, n*k, factor(f))   # matching treatments
tm
```

```
##  [1] Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2 Item3 Item1 Item2
## [12] Item3 Item1 Item2 Item3 Item1 Item2 Item3
## Levels: Item1 Item2 Item3
```

```r
av = aov(r ~ tm)

summary(av)
```

```
##             Df Sum Sq Mean Sq F value Pr(>F)
## tm           2    763   381.5   2.579  0.109
## Residuals   15   2219   147.9
```