

MATH-650 Assignment 10

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Chapter 13: 12

```
data <- read.csv('case1301.csv')
data$Cover <- data$Cover/100
data$Cover <- log(data$Cover/(1-data$Cover))
grandmean <- mean(data$Cover)
agg <- aggregate(Cover ~ Treat, data, mean)
agg
```

```
##      Treat      Cover
## 1 CONTROL  0.1804836
## 2      f -0.3136515
## 3     fF -0.8214197
## 4      L -1.7119924
## 5     Lf -2.0043847
## 6    LfF -2.7246679
```

```
agg1 <- aggregate(Cover ~ Treat + Block, data, mean)
agg1
```

```
##      Treat Block      Cover
## 1 CONTROL   B1 -1.51180059
## 2      f    B1 -1.62171030
## 3     fF    B1 -2.04909167
## 4      L    B1 -3.17805383
## 5     Lf    B1 -3.21026883
## 6    LfF    B1 -4.24347007
## 7 CONTROL   B2 -0.94235279
## 8      f    B2 -1.30770463
## 9     fF    B2 -1.96591282
## 10     L    B2 -2.51451819
## 11     Lf    B2 -3.11381700
## 12    LfF    B2 -3.21026883
## 13 CONTROL   B3  1.11226627
## 14      f    B3  0.22200404
## 15     fF    B3 -0.12058103
## 16      L    B3 -0.31084411
## 17     Lf    B3 -1.55687711
## 18    LfF    B3 -2.53258512
## 19 CONTROL   B4  2.84798715
## 20      f    B4  1.83818418
## 21     fF    B4  0.63823686
## 22      L    B4 -0.80683089
## 23     Lf    B4 -0.52153713
```

```
## 24      LfF      B4 -1.92617786
## 25 CONTROL      B5 -0.27157495
## 26       f      B5 -0.68573964
## 27      fF      B5 -0.68437097
## 28       L      B5 -1.39946308
## 29      Lf      B5 -2.62903695
## 30      LfF      B5 -2.84798715
## 31 CONTROL      B6  0.71069284
## 32       f      B6 -0.18363476
## 33      fF      B6 -0.40616081
## 34       L      B6 -1.22917369
## 35      Lf      B6 -0.66390985
## 36      LfF      B6 -1.89142592
## 37 CONTROL      B7 -0.78507724
## 38       f      B7 -0.08085342
## 39      fF      B7 -0.73537410
## 40       L      B7 -2.59694117
## 41      Lf      B7 -2.58524200
## 42      LfF      B7 -2.37986447
## 43 CONTROL      B8  0.28372826
## 44       f      B8 -0.68975734
## 45      fF      B8 -1.24810310
## 46       L      B8 -1.66011416
## 47      Lf      B8 -1.75438883
## 48      LfF      B8 -2.76556416
```

Part (a)

```
means <- agg$Cover
variance <- var(means)
variance
```

```
## [1] 1.212415
```

```
16*variance
```

```
## [1] 19.39864
```

which is what is in Display 13.11

Part (b)

```
#block.averages <- c(-2.64, -2.18, -.53, .34, -1.42, -.61, -1.53, -1.31)
agg2 <- aggregate(Cover ~ Block, agg1, mean)
variance.block.averages <- var(agg2$Cover)
agg2
```

```
##   Block      Cover
## 1    B1 -2.6357325
```

```
## 2    B2 -2.1757624
## 3    B3 -0.5311028
## 4    B4  0.3449771
## 5    B5 -1.4196955
## 6    B6 -0.6106020
## 7    B7 -1.5272254
## 8    B8 -1.3056999
```

```
12*variance.block.averages
```

```
## [1] 10.89123
```

which is same as what is in Display 13.11

Part (c)

```
cell48.variance <- var(agg1$Cover)
2*cell48.variance
```

```
## [1] 4.009835
```

which is same as model mean square in Display 13.10

Part (d)

```
fit <- aov(Cover ~ Treat + Block + Block*Treat, data=data)
s <- summary(fit)
s
```

```
##              Df Sum Sq Mean Sq F value Pr(>F)
## Treat          5  96.99   19.399   64.055 <2e-16 ***
## Block          7  76.24   10.891   35.963 <2e-16 ***
## Treat:Block    35   15.23    0.435    1.437  0.121
## Residuals     48   14.54    0.303
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

```
block.ss <- 76.2386
treatment.ss <- 96.9932
interaction.ss <- 15.2304
between.ss <- 188.4622
between.ss - (block.ss+treatment.ss)
```

```
## [1] 15.2304
```

which is the same as `interaction.ss`(interaction sum of squares)