Lec20_(b)

(b)

```
aba <- read.csv("Abalone.csv")
aba$Sexf <- factor(x=aba$Sex, labels=c("I", "M", "F"))
fit <- glm(Rings ~ Sexf*log(Shell), family = poisson(link = "log"), data = aba)
library(mcprofile)
```

```
## Loading required package: ggplot2
```

```
k.change <- matrix(c(0, 0, 0, log(1+0.1/0.1), 0, 0,
                     0, 0, 0, log(1+0.1/0.1), log(1+0.1/0.1), 0,
                     0, 0, 0, log(1+0.1/0.1), 0, log(1+0.1/0.1),
                     0, 0, 0, log(1+0.1/0.2), 0, 0,
                     0 ,0 ,0, log(1+0.1/0.2), log(1+0.1/0.2), 0,
                     0, 0, 0, log(1+0.1/0.2), 0, log(1+0.1/0.2),
                     0, 0, 0, log(1+0.1/0.3), 0, 0,
                     0, 0, 0, log(1+0.1/0.3), log(1+0.1/0.3), 0,
                     0, 0, 0, log(1+0.1/0.3), 0, log(1+0.1/0.3)), nrow = 9, byrow = TRUE)

# Ratio change
rc <- exp(confint(mcprofile(fit, k.change)))


#Convert to percentage change
i_0.1 <- unlist(rc$estimate)
ii_0.1 <- unlist(rc$confint)
est_0.1 <- 100*(i_0.1-1)
ci_0.1 <- 100*(ii_0.1-1)

change.est <- data.frame('Percentage Change' = est_0.1, lower = ci_0.1[1:9], upper = ci_0.1[10:18])
change.est <- `row.names<-`(change.est, c("Weight 0.1 Infant", "Weight 0.1 Male", "Weight 0.1 Female", "Weig
ht 0.2 Infant", "Weight 0.2 Male", "Weight 0.2 Female", "Weight 0.3 Infant", "Weight 0.3 Male", "Weight 0.3
Female"))
change.est
```

```
##                   Percentage.Change     lower     upper
## Weight 0.1 Infant         23.035671 20.426373 25.725474
## Weight 0.1 Male           19.471523 16.714177 22.325579
## Weight 0.1 Female         18.294205 14.726603 21.994238
## Weight 0.2 Infant         12.892420 11.485686 14.329655
## Weight 0.2 Male           10.967749  9.462357 12.510829
## Weight 0.2 Female         10.326768  8.368056 12.332459
## Weight 0.3 Infant          8.984882  8.019582  9.967510
## Weight 0.3 Male            7.663284  6.624944  8.723382
## Weight 0.3 Female          7.221672  5.867548  8.601058
```

```
# Report coefficient matrix
k.change
```

```
##       [,1] [,2] [,3]      [,4]      [,5]      [,6]
##  [1,]    0    0    0 0.6931472 0.0000000 0.0000000
##  [2,]    0    0    0 0.6931472 0.6931472 0.0000000
##  [3,]    0    0    0 0.6931472 0.0000000 0.6931472
##  [4,]    0    0    0 0.4054651 0.0000000 0.0000000
##  [5,]    0    0    0 0.4054651 0.4054651 0.0000000
##  [6,]    0    0    0 0.4054651 0.0000000 0.4054651
##  [7,]    0    0    0 0.2876821 0.0000000 0.0000000
##  [8,]    0    0    0 0.2876821 0.2876821 0.0000000
##  [9,]    0    0    0 0.2876821 0.0000000 0.2876821
```

```
# Find the same thing manually from part (a)

# Estiamtes from part (a) leave 2 decimal places
w0.2 <- c(9.51, 10.06, 10.25)
w0.3 <- c(10.74, 11.16, 11.31)
w0.4 <- c(11.70, 12.02, 12.12)

#Manually compute rate of change
q <- (w0.3-w0.2)/w0.2 # 0.2 to 0.3
w <- (w0.4-w0.3)/w0.3 # 0.3 to 0.4
qq <- data.frame(manual = q)
ww <- data.frame(manual = w)
mn <- rbind(qq, ww)
cop <- cbind(change.est$Percentage.Change[4:9], mn)
cop <- `colnames<-`(cop, c("estimate", "manual"))
cop <- `row.names<-`(cop, c("Infant 0.2", 'Male 0.2', 'Female 0.2', "Infant 0.3", 'Male 0.3', 'Female 0.3'))
cop
```

```
##             estimate     manual
## Infant 0.2 12.892420 0.12933754
## Male 0.2   10.967749 0.10934394
## Female 0.2 10.326768 0.10341463
## Infant 0.3  8.984882 0.08938547
## Male 0.3    7.663284 0.07706093
## Female 0.3  7.221672 0.07161804
```

By comparing mcprofile and manual results, the changes are almost identical, tiny difference is predictable because I rounded results from part(a) to the second decimal place before calculation.