in class 8

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Using the gout produce 95% bootstrap CI for the following:

- Male/Female odds ratio
- B/W odds ratio
- Probability of developing gout for each of the following cases - W/F/55 - B/F/55 - W/M/55 - B/M/55

1. Create a bootstrap sample of the data (e.g., `tmpData`).
2. Fit a logistic regression model to the bootstrap sample (fm=glm(gout2~sex+race+age,data=Y,family='binomial'))
3. From the fitted model calculate the odds and risk probabilities listed above.
4. Repeat 1-3 5,000 times, each time with a different bootstrap sample. Store the odds and risk probabilities in a matrix or data frame.
5. Compute 95% CI by applying the quantile function to the bootstrap estimates of odds and risk probabilities.

```r
GOUT <- read.table('goutData.txt', header = T)

colnames(GOUT)
```

```
## [1] "sex"  "race" "age"  "su"   "gout"
```

```r
GOUT$gout <-  as.numeric(GOUT$gout == 'Y')
GOUT$sex <-  as.numeric(GOUT$sex == 'F')
GOUT$race <-  as.numeric(GOUT$race == 'B')
```

```r
nRep = 5000
n = nrow(GOUT)

resMat <- matrix(NA, nRep, ncol(GOUT)-1)
resMat2 <- matrix(NA, nRep, 4)

Z = cbind(1, c(1,1,0,0), 55, c(0,1,0,1))
colnames(Z) <- c("int", "sex", "age", "race")
rownames(Z) <- c("W/F/55", "B/F/55", "W/M/55", "B/M/55")

set.seed(19700101)

i = 1

for (i in 1:nRep){
  TMP <- GOUT[sample(1:nrow(GOUT), size = nrow(GOUT), replace = T),]
  fm <- glm(gout~sex + age + race, data = TMP, family = binomial(link = "logit"))
  resMat[i,] <- exp(summary(fm)$coef[2:ncol(GOUT)-1,1])
  LP <- Z%*%coef(fm)
  resMat2[i,] <- exp(LP)/(1+exp(LP))
}

print(c("M/F odds ratio", "B/W odds ratio"))
```

```
## [1] "M/F odds ratio" "B/W odds ratio"
```

```r
colMeans(resMat[,c(1,3)])
```

```
## [1] 0.002104405 1.099336970
```

```r
print(c("W/F/55", "B/F/55", "W/M/55", "B/M/55"))
```

```
## [1] "W/F/55" "B/F/55" "W/M/55" "B/M/55"
```

```r
colMeans(resMat2)
```

```
## [1] 0.02427107 0.04815188 0.03691505 0.07286635
```

```r
quantile(resMat[,1], c(0.025, 0.975)) # sex
```

```
##        2.5%        97.5%
## 1.345485e-06 1.508055e-02
```

```r
quantile(resMat[,3], c(0.025, 0.975)) # race
```

```
##    2.5%    97.5%
## 1.027289 1.183137
```

```r
quantile(resMat2[,1], c(0.025, 0.975)) # W/F/55
```

```
##        2.5%        97.5%
## 0.006488449 0.051421106
```

```r
quantile(resMat2[,2], c(0.025, 0.975)) # B/F/55
```

```
##      2.5%      97.5%
## 0.01446847 0.09862777
```

```r
quantile(resMat2[,3], c(0.025, 0.975)) # W/M/55
```

```
##      2.5%      97.5%
## 0.01177147 0.07516946
```

```r
quantile(resMat2[,4], c(0.025, 0.975)) # B/M/55
```

```
##      2.5%      97.5%
## 0.02357826 0.14695071
```