

Practice exam 1

Benjamin Smith

10/9/2019

```
crab <- read.table('crab.txt')

require(MASS)

## Loading required package: MASS
head(birthwt)

##      low age lwt race smoke ptl ht ui ftv  bwt
## 85    0  19 182   2    0  0  0  1  0 2523
## 86    0  33 155   3    0  0  0  0  3 2551
## 87    0  20 105   1    1  0  0  0  1 2557
## 88    0  21 108   1    1  0  0  1  2 2594
## 89    0  18 107   1    1  0  0  1  0 2600
## 91    0  21 124   3    0  0  0  0  0 2622

attach(birthwt)

bwt2 <- ifelse(bwt<2400, 1, 0)

glm(bwt2~ age + race + smoke, family = binomial(link = logit))

##
## Call:  glm(formula = bwt2 ~ age + race + smoke, family = binomial(link = logit))
##
## Coefficients:
## (Intercept)          age          race          smoke
##   -2.11239    -0.01623     0.49401     0.80976
##
## Degrees of Freedom: 188 Total (i.e. Null);  185 Residual
## Null Deviance:      205.1
## Residual Deviance: 197.1    AIC: 205.1

NegLoglik <- function(X,y,b){
  eta <- X %*% b
  p=exp(eta)/(1+exp(eta))
  Loglik <- sum(ifelse(y==1, log(p), log(1-p)))
  return(-Loglik)
}

y = bwt2

X = cbind(1, age, race, smoke)

b.ini = c(0,0,0,0)
optim(par=b.ini, fn=NegLoglik, X=X, y=y)

## $par
## [1] -2.11390018 -0.01618486  0.49413329  0.81006405
```

```

##
## $value
## [1] 98.52774
##
## $counts
## function gradient
##      299      NA
##
## $convergence
## [1] 0
##
## $message
## NULL
detach(birthwt)

n = 1

while (n<=6){
  print((-1/n)^n)
  n = n+1
}

## [1] -1
## [1] 0.25
## [1] -0.03703704
## [1] 0.00390625
## [1] -0.00032
## [1] 2.143347e-05

attach(crab)

PosiNegLoglik <- function(X,y,b){
  lambda <- exp(X %*% b)
  Loglik <- sum(y*log(lambda)-lambda)
  return(-Loglik)
}

y = V6

X = cbind(1, V4, V5 )

b.ini = c(0,0,0)

optim(par=b.ini, fn=PosiNegLoglik, X=X, y=y)

## $par
## [1] -1.29058787  0.04583445  0.44765265
##
## $value
## [1] -72.44299
##
## $counts
## function gradient
##      178      NA
##

```

```
## $convergence
## [1] 0
##
## $message
## NULL
```

```
set.seed(12345)
```

```
COXPH_C <- function(x){
  beta <- c(1,1)
  Z <- cbind(runif(1, 0, 10), runif(1, 0, 5))
  t <- exp(-0.5*x*exp(Z%*%beta))
  return(t)
}
```

```
COXPH_C(1e-4)
```

```
##           [,1]
## [1,] 0.004565122
```

```
COXPH_C(13)
```

```
##           [,1]
## [1,] 0
```

```
## changing the seed is a much different result
```

```
set.seed(12)
```

```
COXPH_C <- function(x){
  beta <- c(1,1)
  Z <- cbind(runif(1, 0, 10), runif(1, 0, 5))
  t <- exp(-0.5*x*exp(Z%*%beta))
  return(t)
}
```

```
COXPH_C(1e-4)
```

```
##           [,1]
## [1,] 0.9940477
```

```
COXPH_C(13)
```

```
##           [,1]
## [1,] 0
```