lab1

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$\beta_{(t+1)} = \beta^{(t)} - (-\sum_{i=1}^{n} e^{\mathbf{X}_i\beta}\mathbf{X}_i\mathbf{X}_i^T)^{-1}(\sum_{i=1}^{n}(y_i - e^{\mathbf{X}_i\beta})\mathbf{X}_i^T)$

```
bike <- read_csv("210830_bikecrash.csv")
```

```
##
## -- Column specification --------------------------------------------------------
## cols(
##   county = col_character(),
##   pop = col_double(),
##   med_hh_income = col_double(),
##   traffic_vol = col_double(),
##   pct_rural = col_double(),
##   crashes = col_double()
## )
```

```
# attempt to replicate these results

m1 <- glm(crashes ~ traffic_vol + pct_rural,
          data = bike,
          family = "poisson")
round(summary(m1)$coef[,1], 4)
```

```
## (Intercept) traffic_vol   pct_rural
##      5.9822      0.0015     -0.0446
```

```
calc.score <- function(beta, X, y){
  d1 <- rep(0, length(beta))
  for(i in 1:length(y)){
    d1 <- d1 + (y[i] - exp(X[i,] %*% beta)) %*% X[i,]
  }
  return(colSums(d1))
}
```

```
calc.hess <- function(beta, X, y){
  d1 <- rep(0, length(beta))
  for(i in 1:length(y)){
    d1 <- d1 + (exp(X[i,] %*% beta) %*% t(X[i,]) %*% X[i,])
  }
  return(-colSums(d1))
}
```

```
crash <- bike$crashes
traf <- bike$traffic_vol

ex <- bind_cols(traf, bike$pct_rural) %>%
  janitor::clean_names()
```

```
## New names:
## * NA -> ...1
## * NA -> ...2
```

```
# this does work
calc.score(as.matrix(c(1,1)), as.matrix(ex), as.matrix(crash))
```

```
## [1] -5.606403e+176 -8.516056e+174
```

```
# this does not
#calc.hess(as.matrix(c(1,1)), as.matrix(ex), as.matrix(crash))
```