

```
library(MASS)
a <- read.table("http://www.stat.ucla.edu/~nchristo/statistics100c/restaurant.txt",
               header = T)
x <- matrix(c(rep(1,100),a$food,a$decor, a$ser), nrow=100, ncol=4)
x_transpose_x <- (t(x) %*% x) ;x_transpose_x
```

```
##      [,1] [,2] [,3] [,4]
## [1,] 100 1943 1609 1764
## [2,] 1943 38445 31764 34722
## [3,] 1609 31764 27671 29108
## [4,] 1764 34722 29108 31748
```

```
y <- matrix(a$cost)
beta_hat = ginv(x_transpose_x) %*% t(x) %*% y;beta_hat
```

```
##      [,1]
## [1,] -35.3098383
## [2,]  1.2838518
## [3,]  1.7773844
## [4,]  0.2804128
```

```
lm(cost ~ ., data= a)
```

```
##
## Call:
## lm(formula = cost ~ ., data = a)
##
## Coefficients:
## (Intercept)      food      decor      ser
##   -35.3098      1.2839      1.7774      0.2804
```

```
H <- x %*% ginv(x_transpose_x) %*% t(x)
H[1:5,1:5]
```

```
##      [,1]      [,2]      [,3]      [,4]      [,5]
## [1,] 0.02333445 0.017090141 0.010247706 0.030288494 0.008920920
## [2,] 0.01709014 0.030828287 0.009747574 0.007121384 0.012518985
## [3,] 0.01024771 0.009747574 0.013348148 0.008131717 0.015062149
## [4,] 0.03028849 0.007121384 0.008131717 0.053772247 0.001936585
## [5,] 0.00892092 0.012518985 0.015062149 0.001936585 0.018606756
```