*

```
x <- c(1.6907,1.7242,1.7552,1.7842,1.8113,1.8369,1.8610,1.8839)
n <- c(59,60,62,56,63,59,62,60)
y <- c(6,13,18,28,52,53,61,60)

> yz <- n-y
> yy <-cbind(y,yz)
> View(yy)
> ow.lgt <- glm(yy~x, family=binomial())
> summary(ow.lgt)

Call:
glm(formula = yy ~ x, family = binomial())

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5941  -0.3944   0.8329   1.2592   1.5940

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -60.717      5.181  -11.72   <2e-16 ***
x             34.270      2.912   11.77   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 284.202  on 7  degrees of freedom
Residual deviance:  11.232  on 6  degrees of freedom
AIC: 41.43

Number of Fisher Scoring iterations: 4

> pchisq(11.232,6)
[1] 0.9185346
> 1-pchisq(11.232,6)
[1] 0.08146544
> ow.lgt$fit
        1         2         3         4         5         6         7
0.05860103 0.16402787 0.36211901 0.60531491 0.79517177 0.90323582 0.95519611
        8
0.97904934

> for (i in 1:length(y)) print(n[i]*ow.lgt$fit[i])
        1
3.457461
        2
9.841672
        3
22.45138
        4
33.89763
        5
50.09582
        6
53.29091
        7
59.22216
        8
58.74296



> ow.prb <- glm(yy~x, family=binomial(link="probit"))
> summary(ow.prb)

Call:
glm(formula = yy ~ x, family = binomial(link = "probit"))
```

```
Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.5714  -0.4703   0.7501   1.0632   1.3449

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -34.935      2.648  -13.19   <2e-16 ***
x             19.728      1.487   13.27   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 284.202  on 7  degrees of freedom
Residual deviance:  10.120  on 6  degrees of freedom
AIC: 40.318

Number of Fisher Scoring iterations: 4

> pnorm(-1.5809,0,1)
[1] 0.05695045
> ow.prb$fit
        1         2         3         4         5         6         7
0.05691142 0.17869349 0.37874084 0.60384830 0.78754962 0.90370973 0.96233307
        8
0.98713279

> ow.gum <- glm(yy~x, family=binomial(link="cloglog"))
> summary(ow.gum)

Call:
glm(formula = yy ~ x, family = binomial(link = "cloglog"))

Deviance Residuals:
     Min        1Q    Median        3Q       Max
-0.80329  -0.55135   0.03089   0.38315   1.28883

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)  -39.572      3.240  -12.21   <2e-16 ***
x             22.041      1.799   12.25   <2e-16 ***
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 284.2024  on 7  degrees of freedom
Residual deviance:   3.4464  on 6  degrees of freedom
AIC: 33.644

Number of Fisher Scoring iterations: 4

> ow.gum$fit
        1         2         3         4         5         6         7
0.09473644 0.18801129 0.33797124 0.54231139 0.75835580 0.91767335 0.98569859
        8
0.99912042
```

HOSMER LEMESHOW

```
> wais.lgt <- glm (s~pkt,family=binomial())
> summary(wais.lgt)

Call:
glm(formula = s ~ pkt, family = binomial())

Deviance Residuals:
    Min       1Q   Median       3Q      Max
-1.6702  -0.7402  -0.4749   0.5200   2.1157

Coefficients:
            Estimate Std. Error z value Pr(>|z|)
(Intercept)   2.4040     1.1918   2.017  0.04369 *
pkt          -0.3235     0.1140  -2.838  0.00453 **
---
Signif. codes:  0 ‘***’ 0.001 ‘**’ 0.01 ‘*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for binomial family taken to be 1)

    Null deviance: 61.806  on 53  degrees of freedom
Residual deviance: 51.017  on 52  degrees of freedom
AIC: 55.017

Number of Fisher Scoring iterations: 5

> 1-pchisq(51.017,52)
[1] 0.5125529


> hosmerlem = function(y, yhat, g=10) {
+   cutyhat = cut(yhat,
+                 breaks = quantile(yhat, probs=seq(0,
+                                                   1, 1/g)),
include.lowest=TRUE)
+   obs = xtabs(cbind(1 - y, y) ~ cutyhat)
+   expect = xtabs(cbind(1 - yhat, yhat) ~ cutyhat)
+   chisq = sum((obs - expect)^2/expect)
+   P = 1 - pchisq(chisq, g - 2)
+   return(list(chisq=chisq,p.value=P))
+ }

> g<-3
> cutyhat <- cut(yhat,
+               breaks = quantile(yhat, probs=seq(0,
+                                                 1, 1/g)),
include.lowest=TRUE)
> cutyhat
 [1] (0.303,0.752] (0.13,0.303]  (0.303,0.752] (0.303,0.752] (0.13,0.303]
 [6] (0.303,0.752] [0.0168,0.13] (0.303,0.752] (0.13,0.303]  (0.303,0.752]
[11] (0.303,0.752] (0.303,0.752] (0.303,0.752] [0.0168,0.13] (0.13,0.303]
[16] [0.0168,0.13] (0.13,0.303]  (0.13,0.303]  (0.13,0.303]  [0.0168,0.13]
[21] [0.0168,0.13] [0.0168,0.13] (0.303,0.752] [0.0168,0.13] (0.303,0.752]
[26] (0.303,0.752] (0.13,0.303]  (0.13,0.303]  [0.0168,0.13] (0.13,0.303]
[31] (0.13,0.303]  (0.13,0.303]  (0.303,0.752] [0.0168,0.13] [0.0168,0.13]
[36] [0.0168,0.13] (0.303,0.752] (0.13,0.303]  [0.0168,0.13] (0.13,0.303]
[41] [0.0168,0.13] (0.13,0.303]  [0.0168,0.13] [0.0168,0.13] (0.13,0.303]
[46] (0.13,0.303]  (0.303,0.752] [0.0168,0.13] (0.13,0.303]  (0.13,0.303]
[51] (0.13,0.303]  (0.303,0.752] [0.0168,0.13] [0.0168,0.13]
Levels: [0.0168,0.13] (0.13,0.303] (0.303,0.752]
> obs = xtabs(cbind(1 - y, y) ~ cutyhat)

cutyhat         V1  y
  [0.0168,0.13] 16  2
  (0.13,0.303]  17  3
  (0.303,0.752]  7  9
> expect = xtabs(cbind(1 - yhat, yhat) ~ cutyhat)
```

```
cutyhat                 V1      yhat
  [0.0168,0.13] 16.664593  1.335407
  (0.13,0.303]  15.520921  4.479079
  (0.303,0.752]  7.814486  8.185514
> chisq = sum((obs - expect)^2/expect)
> P = 1 - pchisq(chisq, g - 2)

> hosmerlem(s,fitted(wais.lgt),g=3)
$chisq
[1] 1.15256

$p.value
[1] 0.2830139
```