Generalized Regressio 11

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```
library(faraway)
df <- orings
```

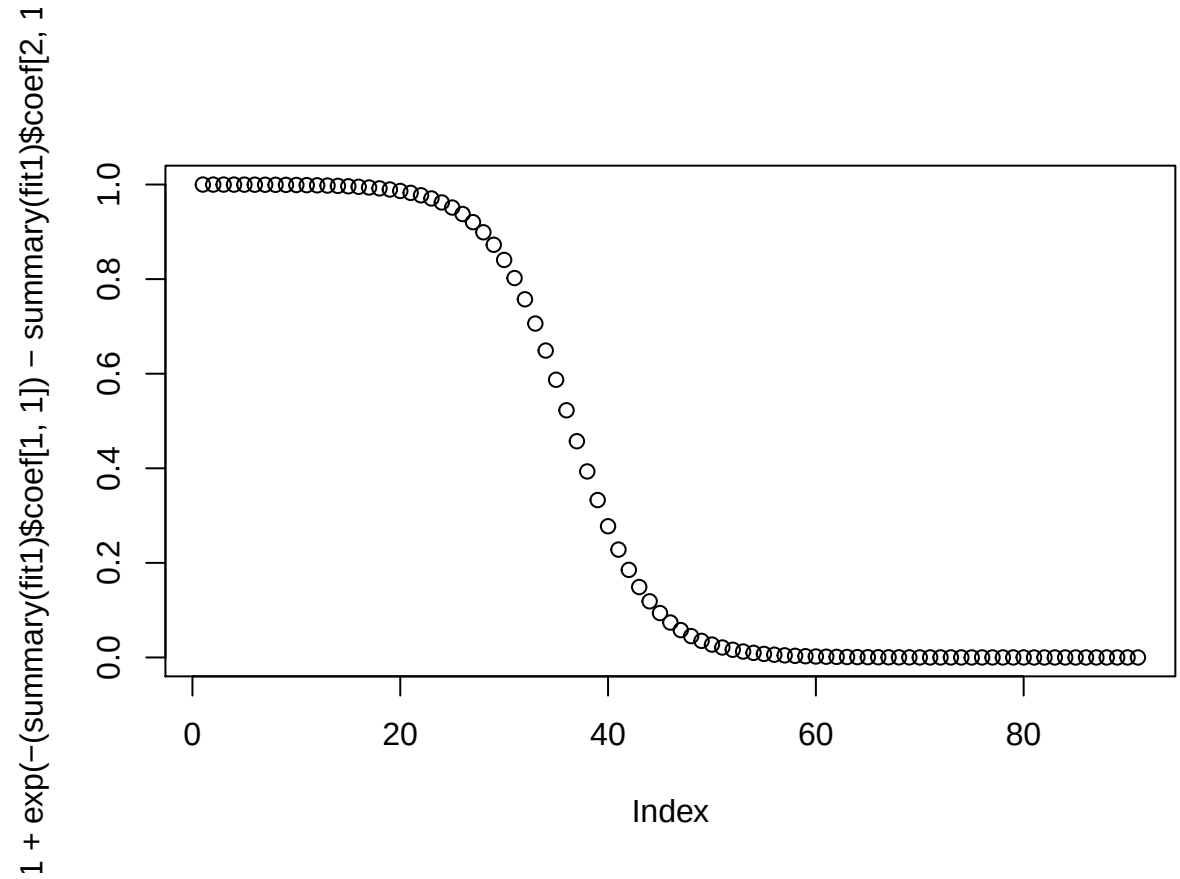
Exercise 2

```
#!!!!!!!!!!!!!!!!
# instead of damage = 5 counts, create 5x entry damage == 1.
df[1,] <- c(53,1)
df[24,] <- c(53,1)
df[25,] <- c(53,1)
df[26,] <- c(53,1)
df[27,] <- c(53,1)
#!!!!!!!!!!!!!!!!
fit1 <- glm(damage ~ temp, data = df, family = binomial(link = "logit"))
summary(fit1)
```

```
##
## Call:
## glm(formula = damage ~ temp, family = binomial(link = "logit"),
##     data = df)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.1055  -0.7195  -0.2672   0.2780   2.2829
##
## Coefficients:
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept) 17.11776    6.76220   2.531  0.01136 *
## temp        -0.26196    0.09996  -2.621  0.00878 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 36.499  on 26  degrees of freedom
## Residual deviance: 20.702  on 25  degrees of freedom
## AIC: 24.702
##
## Number of Fisher Scoring iterations: 5
```

```r
# When using  logit link function, we are getting log odds.
# exp(beta) == multiplicative(?) change in (linear) odds given all other variables constant.
```

```r
x <- seq(30,120, by = 1)
# probability of damage given temperature, page 55 in the book.
plot(1/(1+exp(-(summary(fit1)$coef[1,1])-summary(fit1)$coef[2,1]*x)))
```




```r
fit2 <- glm(damage ~ temp, data = df, family = binomial(link = "probit"))
# probit interpretation: the coefficients have no interepretation per se (really?), but the value of b0
fit3 <- glm(damage ~ temp, data = df, family = binomial(link = "cloglog"))
# interepretation: cloglog leads to discrete Cox proportional Hazards model,
# exp(-Xb) is the hazard ratio comparing conditional cumulative hazard function to baseline (???)
summary(fit2)
```

```
##
## Call:
## glm(formula = damage ~ temp, family = binomial(link = "probit"),
##     data = df)
##
## Deviance Residuals:
##     Min       1Q   Median       3Q      Max
## -1.1314  -0.7596  -0.2468   0.2428   2.2664
##
## Coefficients:
```

```
##             Estimate Std. Error z value Pr(>|z|)
## (Intercept)  9.90041    3.38487   2.925  0.00345 **
## temp        -0.15104    0.04992  -3.026  0.00248 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for binomial family taken to be 1)
##
##     Null deviance: 36.499  on 26  degrees of freedom
## Residual deviance: 20.692  on 25  degrees of freedom
## AIC: 24.692
##
## Number of Fisher Scoring iterations: 7
```