> ###Problem 7.4

> #Complete model

> table<-data.frame(expand.grid(G=factor(c("yes","no"),levels=c("yes","no")),

+ I=factor(c("yes","no"),levels=c("yes","no")),

+ H=factor(c("yes","no"),levels=c("yes","no"))), count=c(76,114,6,11,160,181,25,48))

> table

G I H count

1 yes yes yes 76

2 no yes yes 114

3 yes no yes 6

4 no no yes 11

5 yes yes no 160

6 no yes no 181

7 yes no no 25

8 no no no 48

> options(contrasts=c("contr.treatment","contr.poly"))

> fit<-glm(count~.^2,data=table,family=poisson)

> summary(fit)

Call:

glm(formula = count ~ .^2, family = poisson, data = table)

Deviance Residuals:

1 2 3 4 5 6 7 8

-0.10362 0.08516 0.39073 -0.26626 0.07183 -0.06730 -0.17923 0.13173

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) 4.3426 0.1120 38.763 < 2e-16 \*\*\*

Gno 0.3856 0.1434 2.689 0.00717 \*\*

Ino -2.7147 0.3035 -8.945 < 2e-16 \*\*\*

Hno 0.7269 0.1353 5.374 7.68e-08 \*\*\*

Gno:Ino 0.4636 0.2406 1.927 0.05401 .

Gno:Hno -0.2516 0.1749 -1.438 0.15035

Ino:Hno 0.8997 0.2852 3.155 0.00160 \*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 445.82335 on 7 degrees of freedom

Residual deviance: 0.30072 on 1 degrees of freedom

AIC: 59.683

Number of Fisher Scoring iterations: 4

> #Reduced model

> table2<-data.frame(expand.grid(G=factor(c("yes","no"),levels=c("yes","no")),

+ I=factor(c("yes","no"),levels=c("yes","no"))), count=c(76+160,114+181,6+25,11+48))

> options(contrasts=c("contr.treatment","contr.poly"))

> fit2<-glm(count~.,data=table2,family=poisson)

> summary(fit2)

Call:

glm(formula = count ~ ., family = poisson, data = table2)

Deviance Residuals:

1 2 3 4

0.5065 -0.4442 -1.2820 1.0491

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) 5.43068 0.06339 85.67 < 2e-16 \*\*\*

Gno 0.28205 0.08106 3.48 0.000502 \*\*\*

Ino -1.77495 0.11399 -15.57 < 2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 362.3651 on 3 degrees of freedom

Residual deviance: 3.1979 on 1 degrees of freedom

AIC: 35.221

Number of Fisher Scoring iterations: 4

> g2<-fit2$deviance-fit$deviance;g2

[1] 2.897174

>

> ###Problem 7.10

> #Complete model

> table3<-data.frame(expand.grid(Safety=factor(c("yes","no"),levels=c("yes","no")),

+ Ejected=factor(c("yes","no"),levels=c("yes","no")),

+ NonfatalInjury=factor(c("yes","no"),levels=c("yes","no"))), count=c(1105,4624,411111,157342,14,497,483,1008))

> options(contrasts=c("contr.treatment","contr.poly"))

> fit3<-glm(count~.^2,data=table3,family=poisson)

> summary(fit3)

Call:

glm(formula = count ~ .^2, family = poisson, data = table3)

Deviance Residuals:

1 2 3 4 5 6 7 8

0.20704 -0.10095 -0.01071 0.01731 -1.59987 0.30951 0.31400 -0.21583

Coefficients:

Estimate Std. Error z value Pr(>|z|)

(Intercept) 7.00137 0.02992 233.99 <2e-16 \*\*\*

Safetyno 1.43913 0.03321 43.33 <2e-16 \*\*\*

Ejectedno 5.92527 0.02996 197.76 <2e-16 \*\*\*

NonfatalInjuryno -3.96315 0.06944 -57.07 <2e-16 \*\*\*

Safetyno:Ejectedno -2.39964 0.03334 -71.97 <2e-16 \*\*\*

Safetyno:NonfatalInjuryno 1.71732 0.05402 31.79 <2e-16 \*\*\*

Ejectedno:NonfatalInjuryno -2.79779 0.05526 -50.63 <2e-16 \*\*\*

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Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

(Dispersion parameter for poisson family taken to be 1)

Null deviance: 1.6249e+06 on 7 degrees of freedom

Residual deviance: 2.8540e+00 on 1 degrees of freedom

AIC: 93.853

Number of Fisher Scoring iterations: 3