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Stat 510

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Homework 7

1**.** Groups with more people are likely to catch **more** fish. Groups with more children are likely to catch **fewer** fish. Groups with campers are likely to catch **more** fish. Groups that use live bait are likely to catch **more** fish.

|  |  |  |  |
| --- | --- | --- | --- |
| > t1 <- table(persons,count)  > a=round(prop.table(t1,1)\*100, 0)  > data1$persons=as.numeric(data1$persons)  > t1.2=table(a[1,1],100-a[1,1])  > persons.table=data.frame(a[,1],100-a[,1])  > names(persons.table)[1:2]=c("0",">1")  > persons.table  0 >1  1 65 35  2 57 43  3 58 42  4 48 52 | > t2 <- table(child,count)  > a=round(prop.table(t2,1)\*100, 0)  > children.table=data.frame(a[,1],100-a[,1])  > names(children.table)[1:2]=c("0",">1")  > children.table  0 >1  0 42 58  1 61 39  2 91 9  3 100 0 | > t3 <- table(camper,count)  > a=round(prop.table(t3,1)\*100, 0)  > camper.table=data.frame(a[,1],100-a[,1])  > names(camper.table)[1:2]=c("0",">1")  > camper.table  0 >1  0 67 33  1 50 50 | > t4 <- table(livebait,count)  > a=round(prop.table(t4,1)\*100, 0)  > livebait.table=data.frame(a[,1],100-a[,1])  > names(livebait.table)[1:2]=c("0",">1")  > livebait.table  0 >1  0 71 29  1 55 45 |

2. Write (i) the estimated Poisson regression model for the count:

(ii) the logistic model for the log(odds) for zeros:

log(odds0) = 1.2853 – 0.5974(*persons*)

(iii) Groups with more children are likely to catch **less** fish; Groups with campers are likely to catch **more** fish; Groups that use live bait are likely to catch **more** fish. Groups with more people are likely to have **more** zeros. (based on direction of coefficients)

Call:

zeroinfl(formula = count ~ child + camper + livebait | persons,

data = data1)

Pearson residuals:

Min 1Q Median 3Q Max

-1.2373 -0.7342 -0.5803 -0.2166 23.1918

Count model coefficients (poisson with log link):

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

(Intercept) 0.1048 0.2612 0.401 0.688

child -1.0721 0.0987 -10.862 < 2e-16 \*\*\*

camper1 0.7558 0.0939 8.049 8.38e-16 \*\*\*

livebait1 1.6316 0.2574 6.340 2.30e-10 \*\*\*

Zero-inflation model coefficients (binomial with logit link):

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

(Intercept) 1.2853 0.3812 3.372 0.000746 \*\*\*

persons -0.5974 0.1677 -3.562 0.000367 \*\*\*

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

Number of iterations in BFGS optimization: 13

Log-likelihood: -997.8 on 6 Df

3. The R output below tells has a p=value less than 0.05. This tells us that the ‘long model’ is superior to the null model.

> pchisq(2\*(logLik(model1)-logLik(model0)),df=4,lower.tail = F)

'log Lik.' 9.561013e-55 (df=6)

4. The p-values provided by the Vuong test are less than 0.05. This tells us that model1 we can reject the null hypothesis which states that the models are the same, statistically speaking. Furthermore it tell us that model1 explains the data better than model2.

> vuong(model1,model2)

Vuong Non-Nested Hypothesis Test-Statistic:

(test-statistic is asymptotically distributed N(0,1) under the

null that the models are indistinguishible)

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Vuong z-statistic H\_A p-value

Raw 3.567232 model1 > model2 0.00018039

AIC-corrected 3.543899 model1 > model2 0.00019713

BIC-corrected 3.502815 model1 > model2 0.00023018

5. Bringing one more child = between 58.5 and 71.8% less catch;

Bringing a camper = between 177.1 and 256% more catch;

Using livebait = between 308.7 and 846.7% times catch.

Bringing one more person = 23.6 and 60.4% less zeros.

> exp(confint(model1))

2.5 % 97.5 %

count\_(Intercept) 0.6655315 1.8530335

count\_child 0.2820948 0.4153542

count\_camper1 1.7713288 2.5595122

count\_livebait1 3.0871379 8.4658187

zero\_(Intercept) 1.7129340 7.6323596

zero\_persons 0.3960962 0.7643492

6. The x axis on the panels is the number of children in each group, the y axis is the number of fish caught, the colored lines represent the number of people in the group and the left panel is for people that did not bring campers and the right is for people that did.

Groups with campers are likely to catch **more** fish; groups with more people are likely to catch **more** fish; groups with more children are likely to catch **less**.

