

# HW5

2023-03-31

## QUESTION 1

```
## fit a log-link model
crab = read.table("HW5-crab.txt", header = TRUE)
M1 = glm(Sa ~ W, family=poisson(link=log), data=crab)
summary(M1)
```

(a)

```
##
## Call:
## glm(formula = Sa ~ W, family = poisson(link = log), data = crab)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.8526  -1.9884  -0.4933   1.0970   4.9221
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -3.30476     0.54224  -6.095  1.1e-09 ***
## W             0.16405     0.01997   8.216  < 2e-16 ***
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for poisson family taken to be 1)
##
##      Null deviance: 632.79  on 172  degrees of freedom
## Residual deviance: 567.88  on 171  degrees of freedom
## AIC: 927.18
##
## Number of Fisher Scoring iterations: 6
```

```
# goodness of fit
res.pearson = residuals(M1, type="pearson")
G.stat = sum(res.pearson^2)
res.dev = residuals(M1, type="deviance")
D.stat = sum(res.dev^2)
pv1 = 1-pchisq(G.stat, df=171)
pv2 = 1-pchisq(D.stat, df=171)
pv1
```

```
## [1] 0
```

```
pv2
```

```
## [1] 0
```

```
M2 = glm(Sa ~ W + Wt, family=poisson(link=log), data=crab)
summary(M2)
```

(a)

```
##
## Call:
## glm(formula = Sa ~ W + Wt, family = poisson(link = log), data = crab)
##
## Deviance Residuals:
##      Min       1Q   Median       3Q      Max
## -2.9308  -1.9705  -0.5481   0.9700   4.9905
##
## Coefficients:
##              Estimate Std. Error z value Pr(>|z|)
## (Intercept) -1.29168    0.89929  -1.436  0.15091
## W             0.04590    0.04677   0.981  0.32640
## Wt            0.44744    0.15864   2.820  0.00479 **
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## (Dispersion parameter for poisson family taken to be 1)
##
##      Null deviance: 632.79  on 172  degrees of freedom
## Residual deviance: 559.89  on 170  degrees of freedom
## AIC: 921.18
##
## Number of Fisher Scoring iterations: 6
```

```
# compare 2 models
test.stat = M1$deviance - M2$deviance
df = 171-170
pv3 = 1-pchisq(test.stat, df = df)
pv3
```

```
## [1] 0.004694838
```