BIOL4113 Fish Biology and Fisheries

**Lab Worksheet: Generalized Linear Models in R**

Name: _____

Throughout this lab, we will be discussing the creation, evaluation, and interpretation of generalized linear models (GLMs). Below are 10 questions that address the key points of what we're trying to accomplish today. We'll be examining these questions (not necessarily in order) through examples and demonstrations so use this sheet as a means of taking notes and hand it in at the end of the lab period.

1. What is the basic research questions that we are trying to answer today using a modelling approach? What is the first thing you should do when you decide you want to model your data?

2. Why is it important to run *diagnostics* on your model?

3. In the simplest of terms, what is a *residual* and what pattern do you want to see in the residuals of a model?

4. What was wrong with using a linear model to model our data?

5. In what way was a Poisson GLM an improvement over a linear model? In what way was a Poisson GLM still inappropriate for modelling our data?

6. In the simplest of terms, what is *overdispersion*? (Hint: a diagram may work well here!)
7. We grouped the residuals generated by our Poisson GLM into two groups, depending on what season (period 1 or 2) the data were collected. What does the resulting plot tell us?
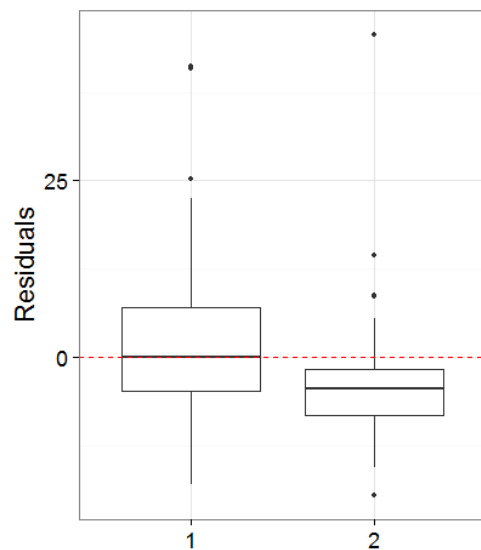
8. How can you use Akaike Information Criterion (AIC) to compare models? What is the major
    limiting factor that needs to be considered when using AIC values?

9. In the simplest of terms, what does the output of our model tell us about the influence of depth
    and period on fish abundance?

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Coefficients:
             Estimate Std. Error z value Pr(>|z|)
(Intercept) -3.31445    0.13673 -24.241  < 2e-16 ***
depth_km    -1.01141    0.04863 -20.798  < 2e-16 ***
fperiod2    -0.43284    0.12625  -3.429 0.000607 ***
---
Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
```

10. Give an estimate of the number of fish we'd expect to catch at a depth of 2000 m during time
    period 1. Is this significantly different than the number we'd expect to catch at the same depth
    during time period 2?