Biology 4605 / 7220 Name ~~Key~~

Quiz 11b 2 December 2015

1. From the following table, compute the mortality risk (% killed), the relative risk at high relative to low seal abundance, the mortality odds [risk / (1 - risk)], and the mortality odds ratio at high seal abundance relative to low. (6)

	Seal abundance Low	High
Surviving	8	32
Killed	8	8

	Low	High		
Odds	1	0.25	Odds ratio	0.25:1
Risk	0.5	0.2	Relative risk	0.4:1

2. Write a generalized linear model (binomial error, logit link) to compare survival in two types of mosquito, controlled for body size. Be sure to assign a symbol and name to all variables, both response and explanatory. (14)

Survival odds	Odds(survive)	Response
Mosquito Type	Type	Explanatory
Body Size	S	Explanatory

$$Odds(survive) = e^{\eta} + \text{binomial error}$$ (1 mark).

$$\eta = \beta_0 + \beta_{Type} \cdot Type + \beta_S \cdot S + \beta_{Type \cdot S} \cdot Type \cdot S$$

3. An agricultural experiment station completes an experiment with 4 treatments in each of 3 different fields, and 2 measurements per treatment.

State the sample size n $12 \times 2 = 24$ (1)

List explanatory variables with name and symbol, then state whether each is random or fixed factor. (6)

Treatment	Tr	Fixed
Fields	F	Random

Write a general linear model to test for treatment effects, where the response variable is a canola yield in kg/hectare. Show degrees of freedom beneath each term in the model. (8)

$$Yield = \beta_0 + \beta_{Tr} \cdot Tr + \beta_F \cdot F + \beta_{Tr \times F} \cdot Tr \cdot F + error$$

$$23 = 3 + 2 + 6 + 22$$

Write a generalized linear model to test for treatment effects where the response variable is a count ranging from 0 to 8 flowers per plant. (6)

$$Count = e^{\eta} + \text{Poisson error}$$ (1 mark)

$$\eta = \beta_0 + \beta_{Tr} \cdot Tr + \beta_F \cdot F + \beta_{Tr \cdot F} \cdot Tr \cdot F$$