Biology 4605/7220 Name___Key_____
Quiz #12b 2 December 2002

1. If you carry out a general linear model analysis and find heterogeneous residuals, name two ways you can obtain a better p-value.

Use a more appropriate error model instead of normal errors
Compute p-value by randomization

2. A general*ized* linear model links a response variable to one or more explanatory variables X_i according to a link function. Here are 3 link functions.

identity link	Y	=	μ	+	error	Used with the general linear model
log link	f	=	e^{μ}	+	error	Used with poisson response variable f
logit link	Odds	=	e^{μ}	+	error	Used with binomial variable expressed as Odds

e is the base of natural logarithms
μ is the sum of a series of explanatory terms: $\mu = \Sigma(\beta_i \cdot X_i)$

Write a generalized linear model for a study of frequency of deaths (D = deaths per month per hospital) in 100 hospitals classified by size (S = number of beds), presence of a medical school (MS = present or absent), and age of the building (A = years). Assume no interactive effects.

$D = e^{\mu} + \text{error}$ $\mu = \beta_o + \beta_S \cdot S + \beta_{MS} \cdot MS + \beta_A \cdot A$

3. Complete the following ANOVA table and write the corresponding general linear model for analysis of bacterial concentration [N].

Source	df	
TR	2	TR= treatment (2 drugs, 1 control group)
tanks	3	all three treatments in each of 4 tanks
Time	4	once a week for 5 weeks
TR*Time	8	
error	102	
total	119	

$[N] = \beta_o + \beta_{TR} \cdot TR + \beta_{tnk} \cdot Tnk + \beta_T \cdot T + \beta_{TR*T} \cdot TR \cdot T + \text{error}$