Biology 4605/7220 Name___Key_______________
Quiz #10b 22 November 2002

1. An epidemiologist obtains a goodness of fit statistic of G = 3.84 in a test of whether the odds of being bitten by mosquitoes in an area with malaria depends the use of protective netting at night.
$G = 2 \Sigma f \ln(f/\hat{f})$ where $\hat{f}$ is the number of people bitten if the odds of being bitten are unaffected by the use of protective netting. Summation is over 2 classes, whether or not netting is used.

Explain how you would evaluate the result, including statistical support for a statement that being bitten depends (or does not depend) on the use of netting.

Use chisquare cumulative frequency distribution (single degree of freedom) to calculate probability of obtaining G = 3.84 when odds of being bitten are unaffected by netting.
If $p < \alpha = 5\%$, reject the null hypothesis, accept the alternative hypothesis, that odds depend on netting.
If $p \geq \alpha = 5\%$, accept the null hypothesis, that odds are independent of netting.

2. An ethologist is interested in whether foraging success (success per attempt) depends on prey type (3 categories) and temperature (continuous variable). Successes and trials are tabulated for 20 different cases (each a fixed period of time). Do the odds of successful prey capture depend on prey type and temperature? Assign symbols to variables. Write a generalized linear model for ln(Odds of success) as a function of prey type and temperature. Assume that interactive effects are possible.

Variable Name	Symbol
Odds of success	_Odds(S)_
___prey type___	__prey____
_temperature___	__T______

Source	df
intercept	1
prey	2
temperature	1
type*temperature	2

GzLM Odds(Success) = e^{μ} + error

$\mu = \beta_o + \beta_{prey} \cdot Prey + \beta_T \cdot T + \beta_{prey*T} \cdot prey \cdot T$

Complete the first two columns of the Analysis of deviance table, above.

3. A geneticist finds that the odds of have a particular allele increase from south to north according the following model, with parameter estimates obtained from logistic regression. Latitude within the species range is measured in degrees (0° at the equator, 90° at the pole).

$$Odds = 1.5e^{0.0055 * Latitude}$$

Compute the odds of having the allele, at Latitude = 32° Odds = _____1.789:1___

Compute the odds of having the allele, at Latitude = 64° Odds = ___2.133:1____

Compute the odds ratio, for 64° relative to 32°. OR = ___1.1924____