Biology 4605/7220   Name_____
Quiz 5b   20 October 2004

In 1950, Marien (*Journal of the Bombay Natural History Society* 49:471) reported wing lengths (in mm) of males of 3 species of starling, *Sturnus contra, Sturnus ginginiamus,* and *Sturnus fusca*.
The number of birds measured was 11 *S. contra*, 12 *S. ginginiamus*, and 8 *S. fusca*.

1. Write a symbol for the
        response variable (____= mm) and
                                     explanatory variable (____= *S.c., S.g., or S.f.*)   [2]

2. Write a general linear model relating the response variable to the explanatory variable.

        _____ = _____[4]

3a. If the symbol for the true (parametric) wing length of *S. contra* is μ_{Sc}
        then write a symbol for the true or parametric wing lengths of

        S. ginginiamus _____   *S. fusca* _____   [2]

3b. Using these three symbols, write an H_A/H_o pair for testing whether wing length depends on species.

        H_A: _____[2]

        H_o: _____[2]

4. Complete the following table. [7]   df = degrees of freedom
                                                                                SS = Sums of squares
                                                                                MS = mean square = SS/df
                                                        F = observed F-ratio of mean squares
                                                                p = Type I error in accepting H_o

Source	df	SS	MS	F	p
Species	_____	_____	40.5	8.1	< 0.005
Residual	_____	_____	_____		
total	30	_____			

4b. Explain why the total df is 30.   [1]