

For each of the following situations (1 through 3):

(A) Define variables in a tabular format, as follows.

<u>name</u>	<u>symbol</u>	<u>scale</u>	<u>Explanatory is</u> <u>Random or Fixed</u>
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scale = nominal, ordinal, or cardinal
cardinal = interval or ratio scale.

(B) Using the symbols, write a general linear model relating the response variable to explanatory variable(s) and interaction terms (if appropriate).

(C) Beneath each term in the model (except β_o) write the degrees of freedom.

(D) State the name of the analysis, from the following list.

t-test, one-way ANOVA, two-way ANOVA, three-way ANOVA
paired comparisons, randomized blocks, hierarchical (nested) ANOVA
regression, multiple regression, ANCOVA
none of the above.

2. O.L. Lacey (*Statistical Methods in Experimentation*, New York: MacMillan, 1953) wished to determine whether adding vitamin B₁ to the diet increases the growth of guinea pigs, where growth is defined as weight gain in grams. 10 animals are treated, 10 are not.

A. name symbol scale Random or Fixed [2+1]

B. _____ = _____ + ϵ [2]

C. _____ = _____ + _____ [3]

D. _____ [1]

4. For the following situations, state whether a randomization test is needed (yes/no).
 n = sample size, p -value calculated from F-distribution, α = criterion for rejection null hypothesis H_0 [4]

n	p-value	α	normal ?	errors		randomize?
				independent?	homogeneous?	
135	0.003	0.05	yes	yes	no	_____
12	0.044	0.05	no	no	no	_____
8	0.001	0.05	no	no	no	_____
9	0.04	0.05	yes	yes	yes	_____

5. Describe how to carry out a randomization test, where the statistic is Shannon Weaver species diversity, and you wish to test whether the diversity differs between two habitats. [2]

6. The **generalized** linear model allows error distributions such as binomial, Poisson, normal, and others. The General Linear Model assumes errors that are independent, identically distributed (=homogeneous), and normal.

Draw an example of errors that are not homogeneous. [2]

Draw an example of errors that are not normal. [2]

Draw an example of errors that are non-independent. [2]