HW2

Finish the problems below (3.3 to 3.7) and then go to HW2 in Quizzes in Canvas to submit some (not all) of your answers. You are allowed to use R to get the results.

3.3* Identify the experimental design in the following studies as either being completely randomized or paired/blocked. If the design is a paired design, then identify the type of pairing (re-using, sorting/grouping or splitting).

    a. In a study of the effect of a diet for reducing weight, the weights of ten subjects are measured both before and after being put on the diet for five weeks.

    b. In a study of flirtatious behavior, sixty male students were given false information about female job applicants. Thirty of the male students selected at random were falsely told that the female applicant was attracted to her interviewer and the other thirty were not told such false information. The men in both groups were asked if the female exhibited any flirtatious behavior on the phone.

    c. In order to determine whether the zipcode+4 gets a letter faster to its destination than just the zipcode, a student data project mailed two letters to each of twenty-six cities. The letters/envelopes were the same except that one had the 5 digit zipcode on it while the other letter had the zipcode+5 digits on it.

3.4* Approximately 200 patients with Alzheimer's disease were measured for mental ability before and after being given 120 mg to 240 mg of ginkgo biloba, a plant extract, daily for three to six months.

    a. What are the conditions of interest to be compared?

    b. What are the "experimental" units?

    c. Are the conditions assigned to the units? Explain

    d. What are the consequences of your response to part (c) on the interpretation of the results of the study?

3.5* A trucking firm wishes to choose between two alternate routes for transporting merchandize from one depot to another. One major concern is the travel time. In a study, 5 drivers are randomly assigned to route A, the other 5 were assigned to route B. Data was obtained from each driver on travel time (hours) and given below.

Route A: 18 24 30 21 32

Route B: 22 29 34 25 35

    a. What is the factor in this experiment?

    b. What is the response variable?

c. Give one extraneous variable whose effects are potentially balanced out by the randomization.

d. Based on the data, is there evidence of a difference in driving time between the two routes? Use the independent samples t test that does not assume anything about the population variances. Use computer software to obtain a P-value. Use a significance level of 0.05.

e. Describe an alternate design for this experiment that would use pairing/blocking.

3.6* In the article "Feeding Preferences of Captive Tassel-Eared Squirrels (*Sciurus Aberti*) for Ponderosa Pine Twigs"(*Journal of Mammalogy [1980]: 734-737*) researchers wanted to determine in a laboratory setting if squirrels could distinguish between twigs from known feeding trees (FT) and nonfeeding trees (FT). The feeding trees and nonfeeding trees were determined in the field by the extent of defoliation and amounts of clipped needles. Squirrels in the field presumably eat from certain Ponderosa pines depending on nutritional quality, the occurrence of certain plant compounds in the tree, pheromonal cures and other contextual factors. Each of five squirrels was tested for preference on 6 different days at two-week intervals. A testing consisting of providing a squirrel with one FT twig and one NFT twig and then measuring the amount of the twig eaten after 24 hours. The data below provide the mean amounts eaten by each of the six squirrels over the 6 day treatment (The data were approximated from a bar graph in the article).

Squirrel	1	2	3	4	5
FT	5.5	4.4	6.0	4.8	8.4
NFT	3.2	2.4	3.2	4.4	1.7

a. Is this an independent samples or paired samples design? Explain.

b. Based on the data, is there evidence that squirrels are attracted to the twigs that come from the FTs. Use statistical software to obtain a P-value. Use a significance level of 0.05.

3.7* The article "Operational Plantations of Improved Slash Pine: Age 15 results" (http://www.rngr.net/Publications/sftic/1983/)compared "improved" and "unimproved" slash pines in terms of volume production and fusiform rust infection after 15 years of planting. The "improved" trees were grown from seeds taken from parents selected for volume production, crown and bole characteristics, and disease resistance. The data below are based on two stands of slash pines, one with improved (I) and one with unimproved (U) trees at each of the 10 locations.

Location	Seed Source	Vol/Acre (ft^3)o.b.	Vol/Acre (ft^3)i.b.	Fusiform %
Appling Co	I	1677	1115	27.3
	U	1792	1181	15.4
Atkinson Co	I	2248	1535	16.8
	U	2041	1355	13.9
Ben Hill Co	I	849	529	28.9
	U	937	570	12.9
Camden Co	I	2252	1534	12.0
	U	2102	1402	8.2
Laurens Co	I	905	592	60.4
	U	1243	794	73.8
Long Co	I	849	534	16.1
	U	994	625	15.2
Toombs Co	I	1076	707	45.2
	U	874	546	41.3
Ware Co	I	1760	1171	5.8
	U	1734	1135	6.7
Wheeler Co	I	447	282	35.9
	U	577	358	33.0
Wayne Co	I	1466	959	13.2
	U	1350	862	10.6

a. This is a paired samples design. Explain.

b. Based on the data, is there evidence that "improved" trees have higher inner bark (i.b.) volume per acre. Use a significance level of 0.05.