

Name: \_\_\_\_\_

AP Statistics Ch13 Two Sample Inference

1. A randomized experiment was performed to determine if the two type of fertilizers: Fox-Farm and Miracle Gro will yield different yields of zucchini. A total of 73 zucchini plants were grown: 36 using Fox-Farm fertilizer and 37 using Miracle Grow. The distribution of the data did not show any skewness and there were no outliers in either data set. The results of the experiment are as shown:

	Fox Farm	Miracle Gro
Average # of Zucchini per plant	54.23	65.34
Standard Deviation	5.43	7.56
Number of Plants	36	37

- a) Indicate what type of test is to be used for this experiment: Z? T? Paired? One Tail? Two Tail?
- b) Indicate the Null and Alternative Hypothesis
- c) Calculate the test statistics to test the hypothesis that the mean number of zucchini plant using either fertilizers are equal.
- d) Calculate the P-value and indicate if the evidence is statistically significant at the 1% significance level
2. An EV maker receives it's batteries from two separate manufacturers. The company wants to determine if batteries from Company A creates longer lasting batteries from Company B. 15 batteries from each company and the HWY mileage (km) of battery are recorded below:

Company A	454	438	462	434	437	485	477	491	438	455	421	488	489	492	487
Company B	412	433	464	419	428	452	452	466	414	449	438	424	411	413	419

- a) Indicate what type of test is to be used for this study: Z? T? Paired? One Sided Or Two Sided?
- b) Indicate the Null and Alternative Hypothesis
- c) Calculate the test statistics to test the hypothesis that the mean battery mileage from the two manufacturers are equal

- d) What is the P-value and indicate if the evidence is statistically significant at the 0.5% significance level
  - e) When performing the test, would the data set be pooled? Explain:
  - f) Create and interpret a 95% confidence interval for the difference in population mean
  - g) What is the standard error of the difference
  - h) What is a Type 1 Error and Type II Error in this study? Indicate the consequences of each error.
3. A large number of randomized experiments were conducted to determine whether taking a particular drug regularly would decrease the chance of getting heart disease amongst obese patients. For the experiment, the drug effect is the difference between the proportion of subjects taking the drug who suffered cardiac arrest and the proportion of subjects taking the placebo who suffered cardiac arrest. Indicate which of the following statements would be true:
- a) If the drug had no effect whatsoever, the p-values will be greater than 0.05 for about 95 percents of the experiments
  - b) When 95 percent confidence intervals are constructed for the population drug effect, those confidence intervals would include 0 about 95% of the time.
4. A study was conducted using data collected on the birth weights of a random sample of 40 pairs of identical twins to determine whether if the twin born first tends to weight more than the twin born second. Let  $\mu F$  be the average birth weight of all twins born first and let  $\mu S$  be the average birth weight of all twins born second. Let there also be a 3<sup>rd</sup> random variable "D" where  $\mu D$  represent the average difference in birth weight (weight of the first twin minus the weight of the second twin).
- a) Indicate what type of test would be appropriate for this study: Z? T? Paired? Explain:
  - b) State the NULL and Alternative hypothesis

5.

An ecologist studying the differences in populations of a certain species of lizards on two different islands collects lizards in live traps, weighs them, and then releases them again. (He marks them so he won't weigh the same lizard twice). During one study period, he collects the following data. All weights are in grams.

	<i>n</i>	Mean (gm)	Std. Dev. (gm)
Sheep Island	24	46.5	5.97
Pig Island	30	44.2	4.24

Which of the following is the correct expression for the test statistic to test the hypothesis that the mean weights on the two islands are equal?