Mixed Hypothesis Review
AP STATISTICS

Name_____
Date_____Per_____

Choose the correct hypothesis test for the following situations

1. A random sample of 49 medical doctors in LA showed that they worked an average of 53.1 hours/week with a standard deviation of 7.2 hours/week. If the California average is 60 hours/week, does this give evidence that the LA doctors work significantly less than the rest of California?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

2. Usually, White blood cell counts are normally distributed with mean 7500.. If a patient has taken 50 laboratory blood tests that have a mean of 7213.75 and a standard deviation of 393.44, does this give evidence that his white blood cell count is significantly different than normal?

Type of test _____

1. 6.

2. Ho:

3. Ha:

4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

3. USA Today reported that in 1992, 39% of all elementary school children claimed that when they grow up they want to do something to help other people. However, in 1995, 128 of a random sample of 317 of these same children claimed that when they grow up they want to do something to help other people. Does this information indicate that there has been an attitude change either way?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

4. The manager of a sporting goods store offered a bonus commission to his salespeople when they sold more goods. A new manager decided to drop the bonus system. For a random sample of six employees, the weekly sales (in dollars) are shown in the following table for each employee with and without the bonus system.

Salesperson	**A**	**B**	**C**	**D**	**E**	**F**
With bonus	2900	3000	5800	4400	5300	5600
w/out bonus	2800	2500	5900	3500	4600	4600

Does this imply that sales dropped when the bonus system was discontinued?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

5. In 1975, a random sample of 1484 adult U.S. citizens was surveyed, and 193 strongly agreed with the statement, ñPeople should take care of themselvesò. Then in 1991, a survey of 1013 adult U.S. citizens showed that only 61 strongly agreed with the statement. Does this indicate that the proportion of U.S. adults who strongly agree with the given statement has dropped?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

6. A statistics professor has been teaching first and second semester statistics for five years. She wants to know if the grades in her first semester classes differ significantly from those of her second semester classes. She takes a random sample of final grades from her two most recent first and second semester classes and gets these data:

1st Sem: 89, 98, 78, 86, 95, 83, 90, 87, 85, 80, 96, 93, 90, 91, 81, 87, 93, 90, 87, 88

2nd Sem: 87, 85, 89, 78, 79, 77, 82, 90, 91, 93, 88, 87, 86, 83, 85, 81, 90, 86, 86, 84
Is there convincing evidence that first semester grades and second semester grades differ significantly?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

7. Reading Nook Bookstore has 750 retail outlets across the country. The sales director wanted to see if Christmas music affects book sales in December. She randomly assigned some of the outlets to pipe in music and others not to. Then sales records for the month of December were kept. The results are shown in below. Is there convincing evidence that there is an association between sales and Christmas music?

	<10,000	10-20,000	>20,000
With music	5	18	7
Without music	10	7	3

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

8. The following is based on information taken from Winter Wind Studies in Rocky Mountain National Park, by Glidden. At five weather stations on Trail Ridge Road in Rocky Mountain National Park, the peak wind gusts (mi/hr) in January and April are recorded below

Weather Station	**1**	**2**	**3**	**4**	**5**
January	139	122	126	64	78
April	104	113	100	88	61

Does this information indicate that the peak wind gusts are higher in January than April?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

9. A Philadelphia newspaper report claims that 24.1% of 18- to 24-year-olds who attend a local college are from Delaware, 15.4% are from New Jersey, 50.7% are from Pennsylvania, and the remaining 9.8% are from other states in the region. Suppose a random sample (150) of 18- to 24-year-olds is taken at the college and the number from each state/region is recorded.

State	**Number of Students**
Delaware	30
New Jersey	39
Pennsylvania	71
Other	10
Total	**150**

Do these data provide evidence at the $\alpha = 0.05$ that the newspaper report is correct?

Type of test _____

1. 6.

2. Ho:

3. Ha:
4. 7.

5. Requirements:

Test statistic _____ P value _____ Reject/fail to reject _____

Conclusion:_____
_____

10. A large company has two shifts---a day shift and a night shift. Parts produced by the two shifts must meet the same specifications. The manager of the company believes that there is a difference in the proportions of parts produced within specifications by the two shifts. To investigate this belief, random samples of parts that were produced on each of these shifts were selected. For the day shift, 188 of its 200 selected parts met specifications. For the night shift, 180 of its 200 selected parts met specifications.

(a) Use a 95 percent confidence interval to estimate the difference in the proportions of parts produced within specifications by the two shifts. State your interval in context of the study.

(part b continued on next page)

(b) Based only on this confidence interval, do you think that the difference in the proportions of parts produced within specifications by the two shifts is significantly different from 0? Justify your answer clearly.

11. A researcher believes that treating seeds with certain additives before planting can enhance the growth of plants. An experiment to investigate this is conducted in a green house. From a large number of Roma tomato seeds, 24 seeds are randomly chosen and 2 are assigned to each of 12 containers. One of the 2 seeds is randomly selected and treated with the additive. The other seed serves as a control. Both seeds are then planted in the same container. The growth, in centimeters, of each of the 24 plants is measured after 30 days. These data were used to generate the partial computer output shown below. Graphical displays indicate that the assumption of normality is not unreasonable.

	N	Mean	St Dev	SE Mean
Control	12	15.989	1.098	0.317
Treatment	12	18.004	1.175	0.339

a. Construct a confidence interval for the mean difference in growth, in centimeters, of the plants from the untreated and treated seeds. Be sure to interpret this interval.

Req Math

Conclusion:_____
_____

b. Based only on the confidence interval in part a, is there sufficient evidence to conclude that there is a significant mean difference in growth of the plants from untreated seeds and the plants from treated seeds? Justify your conclusion.

Answers:

1. 1 sample t-test Ha: $\mu < 60$ t=-6.708 Pvalue =0 Reject Ho.
2. 1 sample t-test Ha: $\mu \neq 7500$ t=-5.14 Pvalue=0 Reject Ho.
3. 1 proportion z-test Ha: $p \neq 0.39$ z=0.5032 Pvalue=.61 Fail to Reject Ho.
4. Paired t-test Ha: $\mu_D > 0$ t=2.8758 Pvalue=0.0174 Reject Ho.
5. 2-proportion z-test Ha: $p_1 - p_2 > 0$ z=5.6687 Pvalue=0 Reject Ho.
6. 2-sample t-test Ha: $\mu_1 - \mu_2 \neq 0$ t=1.95 Pvalue=0.0588 Fail to Reject Ho.
7. χ^2 Independence χ^2 =6.36 Pvalue=0.04 Reject Ho.
8. Paried t-test Ha: $\mu_D > 0$ t=1.24 Pvalue=0.14 Fail to Reject Ho.
9. χ^2 GOF χ^2 =13.8 Pvalue=0.003 Reject Ho.
10. 2-proportion z-interval (-0.013,0.09303) No, no difference, 0 is in our interval
11. 2-sample t-interval (-2.75,-1.28) Yes there is a difference, 0 is not in our interval