CMD 305 - COURSE
(RESEARCH METHODOLOGY & BIOSTATISTICS)

TUTORIAL TOPIC: APPROPRIATE STATISTICAL TEST (Solutions)

1—What are the three criteria to use, in selecting the appropriate statistical test ?

Solution: (1) Type of variables (2) Number of groups in the analysis (3) Sample size

2-- One of the best indicators of the health of a baby is his/her weight at birth. Birth weight of >2500 gms is considered normal . A researcher wants to test whether birth weight of babies born last year in a region are normal. He took a sample of 100 babies and calculated mean and sd of the birth weights. What test he should do to test his hypothesis that the birth weight of babies normal?

Solution: Z-test for single mean.

3--A team of scientists wants to test a new medication to see if it has either a positive or negative effect on intelligence, or no effect at all. In the population, the average IQ is 100 with a standard deviation of 15. A sample of 30 participants who have taken the medication has a mean of 140. Did the medication affect intelligence, using alpha = 0.05? Using an appropriate statistical test they concluded that medication has significantly affected intelligence. What is the statistical test they used here?

Solution: Student's t-test for single mean.

4-- A research survey claims that 9 out of 10 doctors recommend aspirin for their patients with headaches. To test this claim, a random sample of 100 doctors is obtained. Of these 100 doctors, 82 indicate that they recommend aspirin. Is this claim accurate? Using an alpha of 0.05 with a two-tailed test, it was concluded that the claim that 9 out of 10 doctors recommend aspirin for their patients cant be rejected ? What is the statistical test used here?
Solution: Z-test for single proportion

5-- A statistics teacher wants to compare his two classes to see if they performed any differently on the tests he gave that semester. Class A had 25 students with an average score of 70, standard deviation 15. Class B had 20 students with an average score of 74, standard deviation 25. Using alpha 0.05, did these two classes perform differently on the tests? Using an appropriate statistical test, he concluded that there was no significant difference between the performances of Class A and Class B. What is the statistical test the teaher has used ? What is the degrees of freedom in this example ?

Solution: Student's t-test for independent samples. The degrees of freedom:(n1+n2 – 2)= (25+20 – 2)= 43.

6— Researchers want to test the effectiveness of a new anti-anxiety medication. In clinical testing, 64 out of 200 people taking the medication report symptoms of anxiety. Of the people receiving a placebo, 92 out of 200 report symptoms of anxiety. Is the medication working any differently than the placebo? Test this claim using alpha = 0.05. what is the appropriate statistical test we can use in this situation?

Solution : Z-test for two proportions.

7—To test the association between gender and favorite color a study has been done on 500 college boys and girls are asked which is their favorite color: blue, green, or pink? Results are shown below: what is the appropriate statistical test we can use in this situation?

	BLUE	GREEN	PINK	TOTAL
BOYS	100	150	20	300
GIRLS	20	30	180	200
TOTAL	120	180	200	500

Solution: Chi-square test for independence(or association).

8-- In 2010, ages of a random sample of 500 individuals from the same small town was taken.. Below are the results:

<18 years	18-35 years	>35 years
121	288	91

Using alpha = 0.05, would you conclude that the population distribution of ages is equally distributed ?What is the appropriate statistical test we can use in this situation?

Solution: Chi-square test for homogeneity.

9--Researchers want to test a new weight loss pill. The following is the weights (kg) of 10 people before and after taking the pill. How to find the effect of this pill on weight loss ? What test will you do in this situation using alpha = 0.05? What is the degrees of freedom ?

Before	90	100	70	50	70	50	90	60	80	70
After	85	85	65	40	50	40	70	50	50	70

Solution: Student's t-test for paired samples (dependent samples). The degrees of freedom is (n-1) = (10-1)=9

10—When the chi-squared test for 2x2 table is not valid (when the expected numbers are <5) What is an alternative test we use?

Solution: Fisher's exact test.

11— The following data describe numbers of children with different sized palatine tonsils and their carrier status for Strep. pyogenes. What is the statistical test used to oberserve an association between carrier status and size of tonzils ? What is the degrees of freedom in the following table ?

	Tonsils			
	not enlarged	Enlarged	Enlarged greatly	Total
Carriers	19	29	24	72
Non-carriers	497	560	269	1326
Total	516	589	293	1398

Solution: Chi-square test for association. The degrees of freedom is (r-1)(c-1)=(2-1)(3-1)=2.

12. A researcher wants to test the mean systolic blood pressure of Saudi females of Dammam city is 120 mm/hg with 95% confidence. He took a random sample of 525 Saudi females and found the mean systolic blood pressure as 110 mm/hg . what is an appropriate test here to test his hypothesis ?

Solution: Z-test for single mean.

13. We wish to test the proportion of smokers in a region is 15%. Taking a random sample of 320 persons in that region and found the proportion as 22%. what is an appropriate test here to test the hypothesis that sample proportion is not equal to proportion of smokers in that region ?
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Solution : Z-test for single proportion.

14. A researcher wants to test the mean HB of a pregnant women of Malaz area is 12 g/dl. He took a random sample of 20 and found that the mean score is 11g/dl and standard deviation is 34 g/dl. Could this sample originate from a population of mean = 12 g/dl? What is an appropriate test here? What is the degrees of freedom ?

Solution : Student's t-test for single mean. The degrees of freedom is (n-1)=(20-1)=19.

15. A research team claims that their new drug increase the birth weight of babies. In order to test this , he took a random sample of 75 women for treatment group and 75 for Control group and at the end of the study period it was found Average birth Weight 3100 g and SD420g for treatment group and for control average weight was 2750 g and sd 425g. what is an appropriate test to be done here?

Solution : Z-test for two means or student's t-test for independent samples.

16. In a epidemiological survey, 1319 schoolchildren were assessed symptoms of severe cold at the age of 12 and again at the age of 14. At age 12, 356 (27%) children were reported to have severe colds in the past 12 months compared to 468 (35.5%) at age 14.. what test is to be used to test these proportions? What is the degrees of freedom in this 2 x2 table ?

Severe colds at age 12	Severe colds at age 14		Total
	Yes	No	
Yes	212	144	356
No	256	707	963
Total	468	851	1319

Was there a significant increase of the prevalence of severe cold?

Solution: MacNemar's chi-square test. The degrees of freedom is: (r-1)(c-1)= (2-1)(2-1)=1.