BUS 230: Business and Economics Research and Communication
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Practice Exam 2
Spring 2012

MULTIPLE CHOICE: Pick the best answer to each of the following questions (3 points each).

1. Suppose a survey question asks respondents whether they AGREE or DISAGREE to a political statement, and the answers are coded in SPSS so that 0 is DISAGREE and 1 is AGREE. Which of the following statements are *true*?

    (a) The variable cannot be coded this way, because this is a nominal variable.

    (b) A one-sample t-test can be used test hypotheses about the proportion of the population that agrees with the statement.

    (c) A Chi-squared test of independence can be used to determine the number of respondents that agree with the statement.

    (d) None of the above.

2. Suppose a university is interested in determining whether the median student evaluation score for promoted professors is different from professors who have not yet been promoted. Which statistical test would you use?

    (a) Paired-sample t-test.

    (b) Independent samples t-test.

    (c) Mann Whitney U-test.

    (d) Wilcoxon Signed Rank test.

3. Suppose the Wisconsin Department of Transportation is considering requiring people with multiple speeding tickets to take a class on driving safely, and they are interested in determining whether taking the class reduces the chance the offenders will be caught speeding again in the next 12 months. Suppose the Department of Transportation randomly assigns 100 offenders to take the class, and they track the driving records for this group and another group of 80 offenders that did not take the class. If an offender is caught for speeding again in 12 months, the variable tracking this is set to 1 and 0 otherwise. What statistical test would you use to see if there is a difference in the proportion of offenders in each group?

    (a) Paired-sample t-test.

    (b) Independent samples t-test.

    (c) Mann Whitney U-test.

    (d) Wilcoxon Signed Rank test.

4. Which of the following statements concerning nominal data is *true*?

   (a) Nominal data can be used to define two or more groups, for which you can use interval or ratio data to test for differences.

   (b) Nominal data is categorical data in which the categories *cannot* be ordered in a meaningful way.

   (c) A Chi-squared test can be used to determine if there is a relationship between two nominal variables.

   (d) All of the above.

5. Which of the following could be considered an alternative hypothesis for a statistical test?

   (a) The sample mean for group 1 is equal to the sample mean for group 2.

   (b) The sample mean for group 1 is not equal to the sample mean for group 2.

   (c) The population mean for group 1 is equal to the population mean for group 2.

   (d) The population mean for group 1 is not equal to the population mean for group 2.

6. Under which scenario do you find statistical evidence to prove the null hypothesis?

   (a) When the p-value is less than the significance level.

   (b) When the p-value is greater than the significance level.

   (c) When the t-statistic implies you should reject the alternative hypothesis.

   (d) None of the above.

7. Suppose a sales company is interested in determining whether there is a relationship between the number of years experience a salesman has, and average monthly sales revenue he or she generates. Which statistical test would you use?

   (a) Independent samples t-test.

   (b) Chi-squared test of independence.

   (c) Pearson correlation.

   (d) Spearman correlation.

8. Suppose a financial services firm has 4 levels of positions (associate consultant, lead consultant, project manager, and program manager), and 4 performance levels for their annual performance review (excellent, very good, good, poor). Suppose the company wants to determine if there is a linear relationship between performance level and position level. What statistical test would you use?

   (a) Pearson correlation.

   (b) Spearman correlation.

   (c) Independent samples t-test.

   (d) Mann Whitney U-test.

9. A correlation coefficient close to -1 would indicate,

   (a) A math error occurred, because the correlation coefficient must be between 0 and 1.
   (b) When one variable increases the other tends to decrease.
   (c) When one variable increases the other increases.
   (d) None of the above.

10. The sampling distribution for a statistic...

   (a) is equal to the population probability distribution when the sample size is large.
   (b) is a probability distribution for the possible values a statistic can take.
   (c) is a probability distribution for the sample data.
   (d) All of the above.

11. A null hypothesis for the Spearman correlation test for two variables could be,

   (a) There is no difference between the correlation of the first variable and the correlation of the second variable.
   (b) There is a negative linear relationship between the two the variables.
   (c) There is no linear relationship between the two variables.
   (d) The population correlation coefficient is greater than 0.0.

12. Which is NOT a valid consideration when choosing a statistical test?

   (a) What is the scale of measurement for the variables?
   (b) Which variable is the dependent variable and which is the independent variable?
   (c) What is the research question?
   (d) Are you looking for a difference or relationship/co-movement?

13. Which of the following is a correct definition for a p-value?

   (a) A p-value is the probability that the null hypothesis is correct.
   (b) A p-value is the probability that the alternative hypothesis is correct.
   (c) A p-value is the probability of finding the sample evidence given the null hypothesis is true.
   (d) A p-value is the probability of the population mean is equal to the value in the alternative hypothesis.

14. Which of the following types of variables can be used for a Pearson correlation?

    (a) Two interval/ratio variables.
    (b) One interval/ratio variable and one ordinal variable.
    (c) Two nominal variables.
    (d) All of the above.

15. Suppose you collect data on employment status (full-time, part-time, not employed) and extra curricular activity participation (not at all, occasional participation in clubs or sports, active participation in clubs or sports). What statistical test would you use to determine a relationship between these two variables?

    (a) Pearson correlation.
    (b) Spearman correlation.
    (c) Chi-squared test of independence.
    (d) None of the above.

16. Which of the following is NOT a result from the Central Limit Theorem?

    (a) The sampling distribution is normally distributed.
    (b) The standard deviation of the sampling distribution decreases as the sample size increases.
    (c) The mean of the sample is equal to the mean of the population.
    (d) All of the above are results of the Central Limit Theorem.

17. Which of the following is NOT a necessary step for conducting a hypothesis test?

    (a) Stating the null and alternative hypotheses.
    (b) Explaining in plain-English the value of the t-statistic.
    (c) Using the p-value to determine whether to reject or fail to reject the null hypothesis.
    (d) All the above are necessary steps of a hypothesis test.

18. Suppose a researcher collects income data on people who are college graduates and those who are not. What test would you use to determine if there a difference in average income between those who graduating college and those who did not?

    (a) Independent samples t-test.
    (b) Paired samples t-test.
    (c) Chi-squared test of independence.
    (d) One-sample t-test.

19. Suppose a college instructor is interested in whether a class lesson led to an improvement in student learning. To test this, she gives the class a quiz before the lesson, and administers the same quiz after the lesson. What statistical test should she use?

    (a) Independent samples t-test.
    (b) Paired samples t-test.
    (c) Chi-squared test of independence.
    (d) One-sample t-test.

20. Suppose a survey among declared Democrat and Republican voters asked respondents how strongly they agree with a policy statement, with possible answers: strongly agree, agree, disagree, strongly disagree. Suppose you are interested in determining whether the average response was different for Democrats versus Republicans. Which statistical test would you use?

    (a) Independent samples t-test.
    (b) Paired samples t-test.
    (c) Chi-squared test of independence.
    (d) Mann Whitney U-Test.

21. Under which conditions will the sampling distribution for the sample mean be normally distributed?

    (a) When the population is normally distributed.
    (b) When the sample size is large.
    (c) When the assumptions of the central limit theorem hold.
    (d) All of the above.

22. If a p-value for a test is 0.068 and the significance level used in the hypothesis test is 10%, what is your conclusion?

    (a) Fail to reject the null hypothesis.
    (b) Reject the null hypothesis.
    (c) Fail to reject the alternative hypothesis.
    (d) Reject the alternative hypothesis.

23. Which of the following tests involve computing the mean?

    (a) One-sample t-test.
    (b) Pearson correlation coefficient.
    (c) Chi-squared test of independence.
    (d) All of the above.

24. Which of the following research projects would a non-parametric test be appropriate?

    (a) A researcher collects data on 97 individuals to determine whether there is a relationship between credit card debt (measured in dollars) and income (measured in dollars).

    (b) A researcher collects data on 28 individuals to determine whether college-educated 25-29 year old people have more credit card debt (measured in dollars) than non-college-educated people of the same age range.

    (c) A researcher collects data on 78 individuals to see if the ratio of credit card debt to income (a single, ratio variable) for Wisconsin residents is higher than the national average of 5%.

    (d) A researcher collects data on 22 individuals to present descriptive statistics on credit card debt and income.

HYPOTHESIS TESTING: Conduct each of the hypothesis tests below. Remember for each hypothesis test to state the null and alternative hypotheses, report the p-value, report your rejection decision, and state your research conclusion in plain English (8 points each).

25. A researcher is interested in determining whether there is a relationship between grade school children's interests and the class standing. The researcher asked 478 grade school children whether being good at sports, being popular, or getting good grades was their most important goal. Class standing is 1st grade, 2nd grade, 3rd grade, 4th grade, and 5th grade. Use the SPSS output below to test the hypothesis that there is a relationship between these two variables.

Crosstabs

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Goals * Grades	478	100.0%	0	.0%	478	100.0%

Goals * Grades Crosstabulation

Count

		Grades				Total
		1	2	3	4	
Goals	1	10	24	33	23	90
	2	14	33	45	49	141
	3	70	66	55	56	247
Total		94	123	133	128	478

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	31.090[a]	6	.000
Likelihood Ratio	31.836	6	.000
N of Valid Cases	478		

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 17.70.

26. A researcher is interested in whether there is a difference in the unemployment rate of men ages 14-24 (Variable U1 is number of unemployed men aged 14-24 per 1000 men in the age group) and men ages 34-39 (Variable U2 is the number of unemployed men aged 35-39 per 1000 men in the age group). In 1960, the researcher collected data on the unemployment rate of men in these age groups for 47 U.S. states. Use the SPSS output below to test the hypothesis that there is a difference in the unemployment rate for these two groups.

T-Test

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	U1	95.47	47	18.029	2.630
	U2	33.98	47	8.445	1.232

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	U1 & U2	47	.746	.000

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	U1 - U2	61.489	13.008	1.897	57.670	65.309	32.407	46	.000

27. A researcher is interested in determining whether there is a relationship between income inequality and crime rate. In 1960, researchers collected data on crime rate and income inequality for 47 U.S. states. The researcher estimates a Pearson Correlation Coefficient on crime rate and income inequality. Use the output from SPSS given below to test the hypothesis that there is a relationship between crime and income inequality.

Correlations

Correlations

		R	X
R	Pearson Correlation	1	-.179
	Sig. (2-tailed)		.229
	N	47	47
X	Pearson Correlation	-.179	1
	Sig. (2-tailed)	.229	
	N	47	47