AP Stat Take Home Quiz #6 Name ____________________

Ch. 1 - 13

1. The upper 0.01 critical value of the standard normal distribution is

A. 1.645 B. 2.054 C. 2.326 D. 2.576 E. None of these

2. A 95 % confidence interval for the mean μ of a population is computed from a random sample and found to be 9 ± 3. We may conclude that

A. there is a 95 % probability that μ is between 6 and 12.

B. there is a 95% probability that the true mean is 9 and a 95% chance the true margin of error is 3.

C. if we took many, many additional random samples and from each computed a 95% confidence interval for μ, approximately 95% of these intervals would contain μ

D. if we took many, many additional random samples and from each computed a 95% confidence interval for μ, 95% of them would cover the values from 6 to 12.

E. all of the above

3. An agriculture researcher plants twenty-five plots with a new variety of corn. The average yield for these plots is $\bar{x} = 150$ bushels per acre. Assume that the yield per acre for the new variety of corn follows a normal distribution with unknown mean μ and standard deviation σ = 10 bushels per acre. Which of the following would produce a confidence interval with a smaller margin of error than the 90% confidence interval of 150 ± 3.29?

A. Plant only 5 plots rather than 25, since 5 are easier to manage and control.
B. Plant 100 plots rather than 25.
C. Compute a 99% confidence interval rather than a 90% confidence interval. The increase in confidence indicates that we have a better interval.
D. Take several samples of size 25. Some of these confidence intervals will have smaller margins of error.
E. None of the above.

4. In formulating hypothesis for a statistical test of significance , the null hypothesis is often

A. a statement of "no effect" or "no difference".
B. a probability of observing the data you actually obtained.
C. a statement that the data are all 0.
D. 0.05.
E. the probability that the parameter value is actually μ.

5. The *P*-value of a test of a null hypothesis is the probability that

A. assuming the null hypothesis is true, the test statistic will take a value at least as extreme as that actually observed.
B. assuming the null hypothesis is false, the test statistic will take a value at least as extreme as that actually observed.
C. the null hypothesis is true.
D. the null hypothesis is false.
E. the alternative hypothesis is true.

6. In testing hypotheses, which of the following would be strong evidence against the null hypothesis?

A. using a small level of significance
B. using a large level of significance
C. obtaining data with a small *P*-value
D. obtaining data with a large *P*-value
E. None of these

7. In testing hypothesis, if the consequences of rejecting the null hypothesis are very serious, we should

A. Use a very large level of significance
B. Use a very small level of significance
C. Insist that the *P*-value be smaller than the level of significance
D. Insist that the level of significance be smaller than the *P*-value
E. Consult with an expert in the field you're studying for an interpretation of the *P*-value index.

8. An engineer designs an improved light bulb. The previous design had an average lifetime of 1200 hours. The new bulb had a lifetime of 1201 hours, using a sample of 2000 bulbs. Although the difference is quite small, the effect is statistically significant. The explanation is that

A. New designs typically have more variability that standard designs.
B. The sample is very large.
C. The mean of 1200 is large.
D. The new bulbs last longer that the old bulb.
E. All of the above.

9. In assessing the validity of any test of hypothesis, it is good practice to

A. Examine the probability model by using exploratory data analysis on the data.
B. Test the hypotheses at several different levels of significance.
C. Test both one- and two-sided hypotheses to help guarantee consistency.
D. Construct a confidence interval to estimate the magnitude of any difference detected.
E. All of the above

10. If we reject the null hypothesis when, in fact, it was true, we have

A. Committed a Type I error
B. Committed a Type II error
C. A probability of being correct that is equal to the *P*-value.
D. A probability of being correct that is equal to 1 – (*P*-value).
E. Set the α level too high.

11. The Power of a statistical test of a hypothesis is

A. The smallest significance level at which the data will allow you to reject the null hypothesis.
B. Equal to 1 – (*P*-value).
C. The extent to which the test will reject both one-sided and two-sided hypotheses.
D. Defined for a particular alternative value of the parameter of interest and is the probability that a fixed level α significance test will reject the null hypothesis when the particular alternative value of the parameter is true.
E. Equal to 1 – *P*(Type I error)

12. Which of the following will increase the value of the Power in a statistical test of hypothesis?

A. Increase the Type II error probability.   B. Increase the sample size.
C. Reject the null hypothesis only if the *P*-value is smaller than the significance level.
D. Decrease the α level.   E. All of these choices

13. Suppose we have two SRSs from two distinct populations and the samples are independent. We measure the same variable for both samples. Suppose both populations of the values of these variables are normally distributed but the means and standard deviations are unknown. For purposes of comparing the two means, we use

A. 2-sample t procedure   B. matched pairs t procedure
C. 2-proportion z procedure   D. least squares regression line   E. None of these choices

14. Does taking ginkgo tablets twice a day provided significant improvement in mental performance? To investigate this issue, a researcher conducted a study with 150 adult subjects who took ginkgo tablets twice a day for six months. At the end of the study, 200 variables related to the mental performance of the subjects were measured on each subject and the means compared to known means for these variables in the population of all adults. Nine of these variables were significantly better (in the sense of statistical significance) at the $\alpha = 0.05$ level for the group taking the ginkgo tablets as compared to the population as a whole, and one variable was significantly better at the $\alpha = 0.01$ level for the group taking the ginkgo tablets as compared to the population as a whole. It would be correct to conclude that

A. There is very good statistical evidence that taking ginkgo tablets twice a day provides some improvement in mental performance.
B. There is very good statistical evidence that taking ginkgo tablets twice a day provides improvement for the variable was significant at the $\alpha = 0.01$ level. We should be somewhat cautious about making claims for the variables that were significant at the $\alpha = 0.05$ level.
C. These results would have provided very good statistical evidence that taking ginkgo tablets twice a day provides some improvement in mental performance, if the number of subjects had been larger. It is premature to draw statistical conclusions for studies in which the number of subjects is less than the number of variables measured.
D. There is very good statistical evidence that taking ginkgo tablets twice a day provides significant improvement in ten specific areas related to mental condition.
E. None of the above.

15. We wish to test if a new pig feed increases the mean weight gain compared to an old pig feed. At the conclusion of the experiment it was found that the new feed gave a 10 kg bigger gain that the old feed. A 2-sample *t* test with the proper one-sided alternative was performed and the resulting *P*-value was 0.082. This means that

A. there is an 8.2% chance the null hypothesis is true.
B. there was only an 8.2% chance of observing an increase greater than 10 kg (assuming the null is true).
C. there was only an 8.2% chance of observing an increase greater than 10 kg (assuming the null is false).
D. there is an 8.2% chance the alternative hypothesis is true.
E. there is only an 8.2% chance of getting a 10 kg increase.

16. An SRS of size 100 is taken from a population having proportion 0.8 successes. An independent SRS of size 400 is taken from a population having proportion 0.5 successes. The sampling distribution of the difference in sample proportions has what mean?

A. 0.3 B. 0.15 C. The smaller of 0.8 and 0.5.

D. The mean cannot be determined without sampling results. E. None of these choices.

17. A study was conducted to investigate the effectiveness of a new drug for treating Stage 4 AIDS patients. A group of AIDS patients was randomly divided into two groups. One group received the new drug; the other received a placebo. The difference in mean subsequent survival (those with drugs – those without drugs) was found to be 1.04 years, and a 95% confidence interval was found to be 1.04 ± 2.37 years. Based upon this information, we can conclude that

A. the drug was effective since those taking the drug lived, on average, 1.04 years longer.
B. the drug was ineffective since those taking the drug lived, on average, 1.04 years less.
C. there was no evidence the drug was effective since the 95% confidence interval covers 0.
D. there is no evidence the drug was effective since the 95% confidence interval does not cover 0.
E. we can make no conclusions since we do not know the sample size or the actual mean survival for each group.

18. An SRS of size 100 is taken from a population having proportion 0.8 successes. An independent SRS of size 400 is taken from a population having proportion 0.5 successes. The sampling distribution for the difference in sample proportions has what standard deviation?

A. 1.3 B. 0.40 C. 0.047 D. 0.0002

19.A study was carried out to investigate the effectiveness of a treatment. 1000 subjects participated in the study, with 500 randomly assigned to the treatment group and the **other** 500 to the control (placebo) group. A statistically significant difference was reported between the responses of the two groups ($P < 0.005$). Thus,

A. there is a large difference between the effects of the treatment and the placebo.
B. there is strong evidence that the treatment is very effective.
C. there is strong evidence that there is some difference in effect between the treatment and the placebo.
D. there is little evidence that the treatment has any effect.

Use the next scenario to answer questions #20 & #21. Different varieties of fruits and vegetables have different amounts of nutrients. These differences are important when these products are used to make baby food. We wish to compare the carbohydrate content of two varieties of peaches. The data were analyzed with SAS and the following output was obtained:

VARIETY	N	MEAN	STD DEV	STD ERROR	MIN	MAX
1	5	33.6	3.781	1.691	29.000	38.000
2	7	25.0	10.392	3.927	2.000	33.000

VARIANCES	T	DF	PROB > | T |
UNEQUAL	2.0110	8.0	0.0791
EQUAL	1.7490	10.0	0.1109

20. We wish to test if the two varieties are significantly different in their mean carbohydrate content. The null and alternative hypotheses are:

A. $H_o: \mu_1 = \mu_2; H_A: \mu_1 < \mu_2$ B. $H_o: \mu_1 = \mu_2; H_A: \mu_1 > \mu_2$ C. $H_o: \mu_1 = \mu_2; H_A: \mu_1 \neq \mu_2$

D. $H_o: \mu_1 \neq \mu_2; H_A: \mu_1 < \mu_2$ E. $H_o: \mu_1 \neq \mu_2; H_A: \mu_1 > \mu_2$

21. The test statistic and *P*-value are:

A. 1.7490; 0.0318 B. 1.7490; 0.0554 C. 2.0110; 0.1582

D. 2.0110; 0.0791 E. 2.0110; 0.0396

22. Thirty-five people from a random sample of 125 workers from Company A admitted to using sick leave when they weren't really ill. Seventeen employees from a random sample of 68 workers from Company B admitted that they had used sick leave when they weren't really ill. A 95% confidence interval for the difference in the proportion of workers at the two companies who would admit to using sick leave when they weren't ill is

A. $0.03 \pm \sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$ B. $0.03 \pm 1.96\sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$

C. $0.03 \pm 1.645\sqrt{\frac{(0.28)(0.72)}{125} + \frac{(0.25)(0.75)}{68}}$ D. $0.03 \pm 1.96\sqrt{\left(\frac{1}{125} + \frac{1}{68}\right)(0.269)(0.731)}$

E. $0.03 \pm 1.645\sqrt{\left(\frac{1}{125} + \frac{1}{68}\right)(0.269)(0.731)}$

Use the following scenario to answer questions #23 - #25. An experiment was conducted to assess the efficacy of spraying oats with Malathon (at 0.25 lb/acre)) to control the cereal leaf beetle. A sample of 10 farms was selected at random from southwest Manitoba. Each farm was assigned at random to either the control group (no spray) or the treatment group (spray). At the conclusion of the experiment, a plot on each farm was selected and the number of larvae per stem was measured. Here are two possible outputs from Minitab (only one of which is correct; some output hidden).

```
Two-sample T for not spray vs spray


              N     Mean   StDev    SE Mean
Not spray     5     4.09    ****       ****
Spray         5     3.05    ****       ****

Difference = mu (not spray) - mu (spray)
Estimate for difference:  1.04
T-Test of difference = 0 (vs > 0): T-Value = 1.896  P-Value = *****  DF = *****
```

```
Paired T for not spray - spray

            N    Mean  StDev  SE Mean
Not spray   5    4.09      ****      ****
Spray       5    3.05      ****      ****
Difference  5    1.04   ****      ****

T-Test of mean difference = 0 (vs > 0): T-Value = 1.887  P-Value = *****
```

23.The appropriate test statistic and *P*-value are

A. 1.896; 0.033 B. 1.896; 0.131 C. 1.896; 0.065 D. 1.887; 0.059 E. 1.887; 0.118

24. A Type II error would occur if

A. we conclude Malathon is ineffective when in fact it was effective.
B. we conclude Malathon is effective when in fact it is ineffective.
C. we conclude Malathon is effective when in fact it is effective.
D. we conclude Malathon is ineffective when in fact it is ineffective.
E. we conclude Malathon is neither ineffective not effective.

25. Power refers to

A. the ability to detect an effect of Malathon when in fact there is no effect.
B. the ability to not detect an effect of Malathon when in fact there is no effect.
C. the ability to detect an effect of Malathon when in fact there is an effect.
D. the ability to not detect an effect of Malathon when in fact there is an effect.

26. The following are percents of fat found in 5 samples of each of two brands of ice cream.

A	**5.7**	**4.5**	**6.2**	**6.3**	**7.3**
B	**6.3**	**5.7**	**5.9**	**6.4**	**5.1**

Which of the following procedures is appropriate to test the hypothesis of equal average fat content in the two type of ice cream?

A. paired t-test with 5 df B. two-sample t-test with 4 df C. paired t-test with 4 df

D. two-sample t-test with 9 df E. two proportion z test

27. The Excellent Drug Company claims its aspirin tablets will relieve headaches faster than any other aspirin on the market. To determine whether Excellent's claim is valid, random samples of size 15 are chosen from aspirins made by Excellent and the Simple Drug Company. An aspirin is given to each of the 30 randomly selected persons suffering from headaches and the number of minutes required for each to recover from the headache is recorded. The sample results are:

	$\bar{x}$	s^2
Excellent (E)	8.4	4.2
Simple (S)	8.9	4.6

A 5% significance level test is performed to determine whether Excellent's aspirin cures headaches significantly faster than Simple's aspirin. The appropriate hypothesis to be tested are

A. H_o: $\mu_E - \mu_S = 0$; H_A: $\mu_E - \mu_S > 0$ B. H_o: $\mu_E - \mu_S = 0$; H_A: $\mu_E - \mu_S \neq 0$

C. H_o: $\mu_E - \mu_S = 0$; H_A: $\mu_E - \mu_S < 0$ D. H_o: $\mu_E - \mu_S < 0$; H_A: $\mu_E - \mu_S = 0$

E. H_o: $\mu_E - \mu_S > 0$; H_A: $\mu_E - \mu_S = 0$

28. Forty-two of 65 randomly selected people at a baseball game report owning an IPhone. Thirty-four of 52 randomly selected people at a rock concert occurring at the same time across town reported owning an IPhone. A researcher wants to test the claim that the proportion of IPhone owners at the two venues is not the same. A 90% confidence interval for the difference in population proportions is (-0.154, 0.138). Which of the following gives the correct outcome of the researchers' test of the claim?

A. Since the confidence interval includes 0, the researcher can conclude that the proportion of IPhone owners at the two venues is the same.
B. Since the confidence interval includes 0, the researcher can conclude that the proportion of IPhone owners at the two venues may be the same.
C. Since the confidence interval includes 0, the researcher can conclude that the proportion of IPhone owners at the two venues may be different.
D. Since the confidence interval includes more positive than negative values, we can conclude that a higher proportion of people at the baseball game own IPhones than the rock concert.
E. We cannot draw a conclusion about a claim without performing a significance test.

29. A researcher wants to see if birds that build larger nests lay larger eggs. She selects two random samples of nests: one of small nests and the other of large nests. She weighs one egg from each nest. The data are summarized below.

	Small Nests	**Large Nests**
Sample size	**60**	**159**
Sample mean (g)	**37.2**	**35.6**
Sample variance	**24.7**	**39.0**

A 95% confidence interval for the difference between the average mass of eggs in small and large is:

A. $(37.2-35.6)\pm 2.000\sqrt{\frac{24.7}{60}+\frac{39.0}{159}}$

B. $(37.2-35.6)\pm 2.000\sqrt{\frac{24.7^2}{60}+\frac{39.0^2}{159}}$

C. $(37.2-35.6)\pm 2.000\sqrt{\frac{24.7}{59}+\frac{39.0}{158}}$

D. $(37.2-35.6)\pm 2.000\sqrt{\frac{24.7^2}{59}+\frac{39.0^2}{158}}$

30. In a large university (the class of entering freshmen being on the order of 6000 or more students), an SRS of 100 entering freshmen in 2003 found that 20 finished in the bottom third of their high school class. Admission standards were tightened in 2005. In 2007 an SRS of 100 entering freshmen found that 10 finished in the bottom third of their high school class. Let p_1 and p_2 be the proportion of all entering freshmen in 2003 and 2007, respectively, who graduated in the bottom third of their high school class. What conclusions should we draw?

A. We are 95% confident that the admission standards have been tightened.

B. Reject H_o at the α = 0.01 significance level.

C. Fail to reject H_o at the α = 0.05 significance level.

D. There is significant evidence at the 5% level of a decrease in the proportion of freshmen who graduated in the bottom third of their high school class that were admitted by the university.

E. If we reject H_o at the α = 0.05 significance level based on these results, we have a 5% chance of being wrong.

Use the following scenario to answer questions #31– 33. Sixty-eight people from a random sample of 128 residents of Uppsala, Sweden, had blue eyes. Forty-five people from a random sample of 110 people from Preston, England, had blue eyes. Let p_1 represent the proportion of people in Uppsala with blue eyes and let p_2 represent the proportion of people in Preston with blue eyes.

31. If researchers suspected that the distribution of eye color is different in these two countries before collecting the data, which of the following pairs of hypotheses would be appropriate to test?

A. $H_o: p_1 = 0.53, p_2 = 0.41; H_A: p_1 \neq 0.53, p_2 \neq 0.41$

B. $H_o: p_1 = p_2; H_A: p_1 > p_2$

C. $H_o: p_1 = p_2; H_A: p_1 > p_2$

D. $H_o: p_1 = p_2; H_A: p_1 \neq p_2$

E. $H_o: p_1 = p_2; H_A: p_1 < p_2$

32. Which of the following represents the correct conclusion for the significance test described in question #31?

A. Reject H_o at the 5% significance level since the *P*-value is 0.06.

B. Fail to reject H_o at the 5% significance level since the *P*-value is 0.06.

C. Reject H_o at the 5% significance level since the 95% confidence interval for $p_1 - p_2$ is (-0.004, 0.248).

D. Fail to reject H_o at the 10% significance level.

33. Which of conditions A. – C. is ***not*** necessary in order to perform the test in question #31?

A. There must be at least 1280 people in Uppsala, Sweden, and at least 1100 people in Preston, England.

B. *np* and *n*(1 – *p*) must be large enough for Normal calculations to be reasonably accurate.

C. Two independent random samples must be taken.

D. None of the conditions A. – C. is necessary.

E. All of the conditions A. – C. are necessary.

Use the following scenario to answer questions #34 & #35. All of us nonsmokers can rejoice – the mosaic tobacco virus that affects and injures tobacco plants is spreading! Meanwhile, a tobacco company is investigating if a new treatment is effective in reducing the damage caused by the virus. Eleven plants were randomly chosen. On each plant one leaf was randomly selected, and one half of the leaf (randomly chosen) was coated with treatment, while the other half was left untouched (control). After two weeks, the amount of damage to each half of the leaf was assessed. The output from SAS follows:

Variable	N used	Mean	Median	SD	Min	Max
1st : Control	11	15.7273	13	9.1224	5	36
2nd : Treatment	11	13.3636	12	10.0725	2	32
1st – 2nd : Diff	11	2.36364	3	3.32484	-6	6

34. What is the best reason for performing a paired experiment rather than a two-independent sample experiment in this case?

A. It is easier to do since we need fewer experimental units and each unit receives more than one treatment.

B. It allows us to remove variation in the results caused by other factors since we can compare both treatments within the same experimental unit.

C. The computer program is more accurate since we work only with the difference.

D. It requires fewer assumptions since we are interested only in the difference between the treatments.

E. It allows us to do more experiments since we use each experimental unit twice.

35. What are the rejection regions ($\alpha = 0.05$) and *P*-value for the paired *t* test?

A. Reject if $t^* > 1.812$; *P*-value = 0.040 B. Reject if $t^* > 1.812$; *P*-value = 0.020

C. Reject if $t^* > 2.358$; *P*-value = 0.040 D. Reject if $t^* > 2.358$; *P*-value = 0.020

E. Reject if $t^* > 1.645$; *P*-value = 0.020

36. A study was conducted to estimate the effectiveness for doing assignments in an introductory statistics course. Students in one section, taught by instructor A, received not assignments. Students in another section, taught by Instructor B, received assignments. The final grade of each student was recorded. A 95% confidence interval for the difference in the mean grades (Section A – Section B) was computed to be -3.5 ± 1.8. This means that

A. there is evidence that doing assignments improves the average grade since the difference in the population means is less than zero.

B. there is little evidence that doing assignments improves the average grade since the 95% confidence interval does not cover 0.

C. there is evidence that doing assignments improves the average grade since the 95% confidence interval does not cover 0.

D. there is evidence that doing assignments does not improve the average grade since the 95% confidence interval does not cover 0.

E. there is little evidence that doing assignments does not improve the average grade since the 95% confidence interval does cover 0.

37. Which of the following are correct?

I. The power of a significance test depends on the alternative value of the parameter.

II. The probability of a Type II error is equal to the significance level of the test.

III. Type I and Type II errors only make sense when a significance level has been chosen in advance.

A. I and II only B. I and III only C. II and III only D. I, II, and III E. None of these choices

38. Given $H_o : \mu = 30, H_A : \mu < 30$, you conclude that the mean is less than 30 when in fact it is 27:

A. You have made a Type II error. B. You have made a Type I error
C. The result of your test was not significant. D. You have drawn the correct conclusion.
E. All of the above are true.

39. Given α = 0.05, which of the following are true?
A. β = 0.05 B. The power of the test is 0.05. C. α = P(Rejecting H_o when H_o is true)
D. α = P(Rejecting H_o when H_o is false) E. The value of β is independent of the value of α.

40. To determine the reliability of experts used in interpreting the results of polygraph examinations in criminal investigations, 280 cases were studied. The results were:

		True Status	
		Innocent	**Guilty**
Examiner's	**"Innocent"**	**131**	**15**
Decision	**"Guilty"**	**9**	**125**

If the hypothesis were *H_o:* suspect is innocent vs *H_A*: suspect is guilty, then we would estimate the probability of making a Type II error as:

A. 15/280 B. 9/280 C. 15/140 D. 9/140 E. 15/146

41. An opinion poll asks a random sample of adults whether they favor banning ownership of handguns by private citizens. A commentator believes that more than half of all adults favor such a ban. The null and alternative hypotheses you would use to test this claim are:
A. $H_o : \hat{p} = 0.5; H_A : \hat{p} > 0.5$ B. $H_o : \hat{p} = 0.5; H_A : \hat{p} \neq 0.5$
C. $H_o : p = 0.5; H_A : p \neq 0.5$ D. $H_o : p = 0.5; H_A : p > 0.5$

42. In order to study the amounts owed to a particular city, a city clerk takes a random sample of 16 files from a cabinet containing a large number of delinquent accounts and finds the average amount owed to be $\bar{x} = \$230$ with a standard deviation *s* = \$36. It has been claimed that the true mean amount owed on accounts of this type is greater than \$250. If it is appropriate to assume that the amount owed is a normally distributed random variable, the value of the test statistic appropriate for testing the claim is
A. -3.33 B. -1.96 C. -2.22 D. -0.55 E. -2.1314

43. An inspector inspects large truckloads of potatoes to determine the proportion p in the shipment with major defects prior to using the potatoes to make potato chips. Unless there is clear evidence that this proportion is less than 0.10, she will reject the shipment. To reach this decision she will test the hypotheses H_o: $p = 0.10$; H_A: $p < 0.10$ using the large-sample test for a population proportion. To do so, she selects an SRS of 50 potatoes from the more than 2000 potatoes on the truck. Suppose that the potato samples are found to have major defects. Which of the following conditions for inference about a proportion using a hypothesis test are violated?

A. The data are an SRS from the population of interest.

B. The population is at least 10 times as large as the sample.

C. n is so large that both np_o and $n(1 - p_o)$ are 10 or more, where p_o is the proportion with major defects if the null hypothesis is true.

D. There appear to be no violations.

E. More than one condition is violated.

44. Bags of a certain brand of tortilla claim to have a net weight of 14 ounces. Net weights actually vary slightly from bag to bag and are normally distributed with mean μ. A representative of a consumer advocate group wishes to see if there is any evidence that the mean net weight is less than advertised and so intends to test the hypothesis H_o: $\mu = 14$; H_A: $\mu < 14$. To do this, he selects 16 bags of this brand and determines the net weight of each. He finds the sample mean to be $\bar{x} = 13.82$ and the sample standard deviation to be $s = 0.24$. We conclude that we would

A. reject H_o at significance level 0.10 but not at 0.05.

B. reject H_o at significance level 0.05 but not at 0.025.

C. reject H_o at significance level 0.025 but not at 0.01.

D. reject H_o at significance level 0.01.

E. fail to reject H_o at the significance level 0.10.

45. A Type I error in question #44 would mean

A. concluding that the bags are being underfilled when they actually aren't.

B. concluding that the bags are being underfilled when they actually are.

C. concluding that the bags are not being underfilled when they actually are.

D. concluding that the bags are not being underfilled when they actually aren't.

E. none of these.

46. A random sample of 100 voters in a community produced 59 votes in favor of Candidate A. the observed value of the test statistic for testing the null hypothesis H_o: p = 0.5 versus the alternative hypothesis H_A: $p > 0.5$ is

A. $z = \dfrac{0.59 - 0.5}{\sqrt{\dfrac{(0.59)(0.41)}{100}}}$ B. $z = \dfrac{0.59 - 0.5}{\sqrt{\dfrac{(0.5)(0.5)}{100}}}$ C. $t = \dfrac{0.59 - 0.5}{\sqrt{\dfrac{(0.59)(0.41)}{100}}}$ D. $t = \dfrac{0.59 - 0.5}{\sqrt{\dfrac{(0.5)(0.5)}{100}}}$

E. none of these

47. You have data on rainwater collected at 16 locations in the Adirondack Mountains of New York State. One measurement is the acidity of the water, measured by pH on a scale of 0 to 14 (the pH of distilled water is 7.0). Which inference procedure would you use to estimate the average acidity of rainwater in the Adirondacks?

A. one-sample *z* interval for µ B. one-sample *t* interval for µ

C. paired *t*-test D. one-sample *t* test E. one-sample *z* test

48. What is one of the distinctions between a population parameter and a sample statistic?

A. A population parameter is only based on conceptual measurements, but a sample statistics is based on a combination of real and conceptual measurements.
B. A sample statistic changes each time you try to measure it, but a population parameter remains fixed.
C. A population parameter changes each time you try to measure it, but a sample statistic remains fixed across samples.
D. The true value of a sample statistic can never be known but the true value of a population parameter can be known.

49. The value of a correlation is reported by a researcher to be r = -0.5. Which of the following statements is correct?

A. The x-variable explains 25% of the variability in the y-variable.
B. The x-variable explains -25% of the variability in the y-variable.
C. The x-variable explains 50% of the variability in the y-variable.
D. The x-variable explains -50% of the variability in the y-variable.

50. A scatter plot of number of teacher and number of people with college degrees for cities in California reveals a positive association. The most likely explanation for this positive association is

A. Teachers encourage people to get college degrees, so an increase in the number of teachers is causing an increase in the number of people with college degrees.

B. Larger cities tend to have both more teachers and more people with college degrees, so the association is explained by a third variable, the size of the city.

C. Teaching is a common profession for people with college degrees, so an increase in the number of people with college degrees causes an increase in the number of teachers.

D. Cities with higher incomes tend to have more teachers and more teachers going to college, so income in a confounding variable, making causation between number of teachers and number of people with college degrees difficult to prove.

Use the following information to answer #51 – 53. A survey asked people how often they exceed speed limits. The data are then categorized into the following contingency table of counts showing the relationship between age group and response.

	Exceed Limit if Possible?		
Age	**Always**	**Not Always**	**Total**
Under 30	100	100	200
Over 30	40	160	200
Total	140	260	400

51. What's the probability of a person not always exceeding the speed limit?

A. 0.25 B. 0.35 C. 0.50 D. 0.65

52. What's the probability of a person being over 30 years old and not always exceeding the speed limit?

A. 0.29 B. 0.40 C. 0.50 D. 0.62

53. What is the probability that a person over 30 will always exceed the speed limit?

A. 0.20 B. 0.29 C. 0.35 D. 0.50