CHAPTER 9 REVIEW SHEET

A researcher speculates that because of differences in diet, Japanese children may have a lower mean blood cholesterol level 1. than U.S. children do. Suppose that the mean level for U.S. children is known to be 170. What hypotheses should the researcher test?

> Ho: M=170 Hn: 14 \$ 170

- 2. For which of the following P-values (there can be more than one correct answer) will the null hypothesis be rejected when performing a test with a significance level of 0.05:
 - a. 0.001 0.021 0.078 0.047 0.148
- 3. A credit bureau analysis of undergraduate students' credit card records found that the average number of credit cards in an undergraduate's wallet was 4.09 with a standard deviation of 2.7. It was also reported that in a random sample of 132 undergraduates, the sample mean number of credit cards that students said they carried was 2.6.
 - ving is l ما ج م ا nvincing evidence that th mhor of cradit cards that undo

4. A growing concern of employers is time spent in activities like surfing the Internet and e-mailing friends during work hours. The San Luis Obispo Tribune summarized the findings from a survey of a large sample of workers in an article in 2006. Suppose that the CEO of a large company wants to determine whether the average amount of wasted time during an 8-hour workday for employees of her company is less than the reported 120 minutes. Each person in a random sample of 10 employees was contacted and asked about daily wasted time at work.

108	112	117	130	111	131	113	113	105	128
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i. Do these data provide evidence that the mean wasted time for this company is less than 120 minutes? Use a = 0.05.

The true mean amount of time wasted during an 8-hour workday is T. Ho: M= 120 min 120 min. is less Ha: M<120min than 120 min

×=0.05 $II. t = \frac{\bar{x} - \mu}{s_{x/n}} = 1.079 | df = 9$ II. Random-stated 1/se N >10n- safe to assume One $P = v_{allw} = 0.156$ $\hat{X} = 116.8$ $S_{X} = 9.449$ pup. of employees is ? 10 (10)=100 Sample Normal - Normal publicity t plut is fairly TV. Since our p-value (0.156) is greater than a (0.05), test linear " we fail to reject the we do not have enough approximately evidence to show that the employees of the normal company wask less than 120 minutes in an X 8 - how work tog.

> ii. Describe one source of bias for this study and its effect on the data. Since the employees are self-reporting their time wasted, they may not be honost.

> iii. Explain how the data could be collected as an observational study instead of a survey. subjects workday habits and recard the Someone can observe (discretely) each amount of time wasted

5. When 10 vehicles were observed at random for their speeds (in mph) on a freeway (when the legal speed limit was 55), the following data were obtained:

	61	53	57	55	62	58	60	54	62	60
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Conduct a complete significance test, with α = .05, to investigate your belief that drivers seem to be driving in excess of the legal

I.H. M= 55 The thre mean speeds on a freeway is the legal speed limit of 55mph; is greater than the legal speed limit of 55mph. Ha: 11 755 11 11 11 11 11 X=0.05 $\frac{111}{7} \cdot Z = \frac{X - M}{\sqrt{n}} = \frac{58.2 - 55}{3.2} = 3.1622$ 71. Random - stated in problem V N710n-safe to assume pop J OF CAYS exceeds 10(10)=100 P-value = Normaled (3.1622, 00, 0, 1)= 0.000783 Normal-the normal probability IV. Since our p-value (0.000783) is less than & (0.05) 41.21.31.4 *Doc - RAD 40 × Plut We have statistically significant evidence to reject to. There is strong enough ordence to conclude that 15 Expected z k fairly 0.0 linear the true mean speed on freeways is greater x-58.2 3 32666 · approx than me legal speed limit of 55 mph. 53 54 55 56 57 58 59 60 61 62 Normal Safe to use One sample Z-test (since o is known)

- The mean systolic blood pressure for white males ages 35-44 in the US is 127.3. The mean blood pressure for a random sample 6. of 101 diabetic males ages 35-44 is 129. We are interested in determining if the blood pressure for diabetic males differs from that all males in the specified age group
 - i. Perform a significance test at the 0.01 level of significance of the hypothesis that the mean systolic blood pressure is 127.3.
- I. Ho: 127.3 The three mean blood pressure for white males ages 35-44 is 127.3 Ho: 127.3 The three mean blood pressure for white males ages 35-44 is not 127.3 $\chi = 05 \quad \chi = 01$ $II \cdot 2 = \frac{129 - 127.3}{8/15} = 2.1356$ IL SRS-stated Normal - 101230 -: CLT states approx. normal p: 1- normal cdf (-2.1356, 2.1356, 0,1)= (.0327) σ=8 : I sample Z-test J. Since the p-value (.0327) is less than & (.05), therefore we have statistically significant evidence to reject Ho & conclude that the true mean blood pressure for white males ages 35-44 differs from 127.3. J. Since the p-value (.0327) is greater than α (.01), therefore we have statistically significant evidence to reject the d conclude that the true mean blood pressure for white males ages 35-44 differs from 127.3.
 - ii. For the test you conducted in part a, describe a potential consequence if Type I error occurs.
 - iii. For the test you conducted in part a, describe a potential consequence if Type II error occurs.
 - iv. Name two ways to increase the Power of the test.
- 7. To test the hypothesis that the true mean gasoline mileage for American-made cars is 18.5 mpg on the highway with a population standard deviation of 2 mpg, a sample of 121 such automobiles are driven 1,000 miles each. The alternative hypothesis is that the true mean gasoline mileage for American-made cars is different than 18.5 mpg. The researchers will create a 95% confidence interval for the true mean mileage in order to make a decision about the null hypothesis. Find: i. The 95% confidence interval (assuming conditions have been met).

a)
$$18.5 \pm 2(\frac{2}{11}) = 418.136.18.8647.$$

- ii. Using part (a), make a decision to reject or fail to reject the null hypothesis. Clearly explain your reasoning.
- I will fail to reject the if the sample mean lies between 18,136 #

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18,864
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iii. The probability of a Type-I error.

b).05 is the probability of a Type I error.

8. Two methods of computing body fat, UWW (*x*) and MRI (*y*) were compared and the following 20 differences (d = x - y) were obtained: -2.8, 0.8, 1.0, 2.6, -1.4, -1.2, -2.4, 0.9, 3.1, 0, 1.7, 5.6, -1.5, 2.9, 3.6, -1.1, 5.8, -1.1, 6.3, 5.3. Carry out a significance test of the hypothesis that these methods give different results at the .05 level of significance.

5) I. $M_{diff} = 0$ There is no difference $M_{diff} \neq 0$ " a difference $\alpha = .05$ $M_{diff} = D_{diff} = D_{diff}$	II. Since the prake (.0421) is less than $\alpha(.05)$:- we have
I. J Linknown II = 0 therefore is 0.0000 a II = 1.405-0 2.884 Vzo Normel-quantile plot forly linear Z = 122 Z	statistically significant = 2.179 , E99,19)]=.0421 Statistically significant evidence to reject Ho a difference between the two methods of calculating budy fat.
1 .: Matched Pairs t-test	

- 9. Explain the conclusion that can be made if the true mean difference is a negative value in this scenario.
- 10. A cancer research group surveys 500 women more than 40 years of age to test the hypothesis that 28% of women in this age group have regularly scheduled mammograms. Should the hypothesis be rejected at the 5% level if 151 of the women responded affirmatively?
- 11. **Teens And Their TV Sets.** *The New York Times* and CMB News conducted a nationwide poll of 1048 randomly selected 13- to 17-year olds. Of these teenagers, 692 had a television in their room. We will act as if the sample were a random sample.
 - i. Give a 95% confidence interval for the true proportion of all people in this age group who have a TV in their room.
 - ii. The news article says, "In theory, in 19 out of 20, the poll results will differ by no more than three percentage points in either direction from what would have been obtained by seeking out all American teenagers." Explain how your results agree with this statement.
 - iii. Is there good evidence that more than half of all teenagers have a TV in their room? Justify your answer.