

CP Statistics Chapter 11 Practice Free Response Test

Show all work for the following on the answer sheet. Answer completely and clearly.

1. A drug manufacturer claims that 90% of 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. Do these results support the claim of the drug manufacturer? Support your conclusion with a test of significance. Use $\alpha = .01$.
 - (a) State the hypotheses for this test.
 - (b) Check the conditions for this test.
 - (c) Find the test statistic and P-value for this test.
 - (d) State the decision and conclusion for this test.

2. A certain intelligence test is designed to have a population of scores following a normal distribution with a mean score of 100. A group of 20 randomly selected students from Plainview High School are given this intelligence test and the mean score is 103.4 with a standard deviation of 11.651. Do these scores suggest that, on average, the population of students at Plainview HS have higher than average intelligence scores? Carry out an appropriate test at the 5% significance level.
 - (a) State the hypotheses for this test.
 - (b) Check the conditions for this test.
 - (c) Find the test statistic and P-value for this test.
 - (d) State the decision and conclusion for this test.

3. Pharmaceutical researchers wish to test whether a new medication can reduce the duration of migraine headaches. They test the drug versus a placebo on a selection of 80 people who are chronic migraine sufferers. The null hypothesis is that migraine duration will not be reduced by the use of this medication. The alternative hypothesis is that use of the drug will reduce the duration of migraine headaches.
 - (a) What is a Type I error in this setting?
 - (b) What are the consequences of a Type I error in this setting?
 - (c) What is a Type II error in this setting?
 - (d) What are the consequences of a Type II error in this setting?

CP Statistics Chapter 11 Practice Free Response Test - SOLUTIONS

1. One-Proportion Z Test

<p>Hypotheses p = proportion of doctors who recommend aspirin for their patients with headaches $H_0: p = 0.9$ $H_a: p < 0.9$</p>	<p>Test Statistic and P-value $\hat{p} = 82 / 100 = 0.82, n = 100$ $z = \frac{0.82 - 0.9}{\sqrt{\frac{(0.9)(0.1)}{100}}} = -2.667, P = .004$</p>
<p>Conditions SRS: random sample stated Normal: $100(.9) = 90 \geq 10, 100(.1) = 10 \geq 10$ Independent: $10n = 1000$. The population of doctors should easily be more than 1000</p>	<p>Decision and Conclusion</p> <ul style="list-style-type: none"> • Reject the null at the 1% level • The drug manufacturer claim that 90% of doctors recommend aspirin as a treatment for headaches does not appear to be true.

2. One-Sample T Test

<p>Hypotheses μ = intelligence score of Thorndike U. students $H_0: \mu = 100$ $H_a: \mu > 100$</p>	<p>Test Statistic and P-value $\bar{x} = 103.4, s = 11.65$ $t = \frac{103.4 - 100}{11.651 / \sqrt{20}} = 1.305, P = .104$</p>
<p>Conditions SRS: random sample stated Normal: stated as normal Independent: $10n = 200$. The population of students should easily be more than 200.</p>	<p>Decision and Conclusion</p> <ul style="list-style-type: none"> • Fail to reject the null at the 5% level • The students at Plainview HS do not appear to be of higher intelligence than the average person, as judged by this test.

3. Students investigating the packaging of potato chips purchased 6 bags of *Ruffles* potato chips marked with a net weight of 28.3 grams. They carefully weighed the contents of each bag and recorded the following weights (in grams).

- (a) A Type I error in this setting would be concluding that the medication reduces migraine duration when it actually does not.
- (b) The consequences of a Type I error would be that this drug would be marketed as a successful migraine remedy when it is actually not.
- (c) A Type II error in this setting would be concluding that the medication does not reduce migraine duration when it actually does.
- (d) The consequences of a Type II error would be that this drug would be found to be unsuccessful as a migraine remedy and would not be sold even though it does work.