Pledge:

10/6/04 MATH 271 - Applied Stats Name: Solution
Dr. Lunsford Quiz 4 (20 points possible)

You may use your calculator, the formula sheet given to you in class, and/or the tables in the back of your textbook for this quiz. Please show all specified work.

I. Sandy the saleslady is trying to convince Dan the golf pro to buy a new titanium driver. She claims the driver will significantly increase his average distance off the tee. Dan currently has an average driving distance of about 255 yards. Please answer the following:

(a) Formulate a null and alternative hypothesis to test Sandy's claim. Clearly indicate which hypothesis is the claim. (3 points)

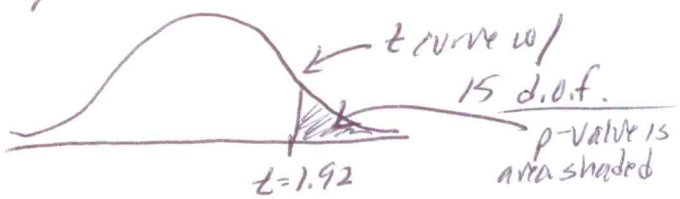
H_0: $\mu = 255$ H_1: $\mu > 255$ (Claim)

(b) Using Sandy's titanium driver, Dan hits 16 balls at the driving range. His average distance for these drives is 267 yards with a standard deviation of 25 yards. What test statistic will you use to conduct the above hypothesis test with this data? Clearly indicate the values of all variables needed to compute the test statistic. Also indicate any assumption(s) you need to make in order to use this test statistic. (2 points)

We will need to make the assumption that Dan's driving distances (i.e. the population) are normally distributed. Since we don't know σ, we will use the t statistic: $t = \frac{\bar{x} - \mu}{\frac{s}{\sqrt{n}}}$ with $\bar{x} = 267$, $\mu = 255$, $s = 25$ and $n = 16$. $\therefore t = 1.92$

(c) Find the p-value for this data. State the meaning of the p-value in English in the context of this hypothesis test and draw a pictorial representation of the p-value using the appropriate test statistic curve. (3 points)

The p-value is 0.037. This is the probability of getting an average driving distance greater than 267 yards for 16 hits assuming Dan's average driving distance is 255 yards.



(d) If you conduct this test at the $\alpha = 0.05$ level of significance, then what is your conclusion and why? (2 points)

Since $p = .037 < \alpha = .05$ we will reject H_0 in favor of H_1. Thus the data support Sandy's claim that the new driver will significantly increase Dan's average driving distance.

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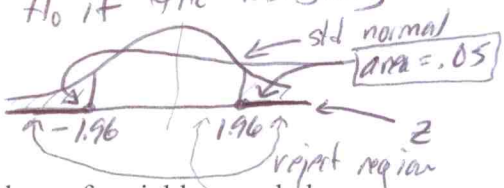
II. Consider testing $H_0 : \mu = 10$ against $H_1 : \mu \neq 10$ at an $\alpha = 0.05$ level of significance when the population has a normal distribution with a known standard deviation of $\sigma = 5$. The data for the test give a sample mean of 12 for 20 random samples from the population.

(a) For which values of the test statistic will the null hypothesis be rejected in favor of the alternative hypothesis (i.e. find the rejection region for the test statistic). Clearly indicate which test statistic you use and why you know you can use it. (3 points)

Since σ is known & the population is normal, we will use the z test stat: $z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}}$. We will reject H_0 if the test stat, z, satisfies either $z < -1.96$ or $z > 1.96$



(b) Compute the appropriate test statistic (clearly indicate the values of variables needed to compute the test statistic) and determine the conclusion of the test based on your rejection criteria above. (2 points)

$\bar{x} = 12, n = 20, \sigma = 5, \mu = 10$

$\Rightarrow z = 1.7889$

Since $-1.96 < z < 1.96$ we will fail to reject H_0.

(c) Find the appropriate confidence interval for the population mean for this hypothesis test. Write the information given in the confidence interval in the form of a probability statement. (3 points)

Since $\alpha = .05$ we will compute a 95% C.I. for μ based on the data. C.I: (9.8087, 14.191)

$P(9.8087 < \mu < 14.191) = 0.95$

(d) Based on the confidence interval computed in part (c), what would be your conclusion to the hypothesis test? (2 points)

Based on our data, with 95% confidence we have μ is between 9.8087 and 14.191. Since our hypothesized μ ($\mu = 10$) falls in this region, there is not enough evidence to reject H_0.