

Lsn33

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Admin

Review Writ

Problem 10.6, n=50

Recall that in many instances we can rely on the Central Limit Theorem to find the distribution of

$$Z = \frac{\hat{\theta} - \theta}{\sigma_{\hat{\theta}}}$$

In those instances we have a natural way to formulate statistical hypothesis tests. For example, let's look at

the following problem. A vice president in charge of sales for a large corporation claims that salespeople are averaging no more than 15 sales contacts per week. As a check on his claim $n = 36$ salespeople are selected at random, and the number of contacts made by each is recorded for a single randomly selected week.

What is H_0 and H_a in this instance?

If we use $Z = \frac{\bar{Y} - \mu_0}{\sigma_{\bar{Y}}}$ as our test statistic, what assumptions are we relying on if we say $Z \sim N(0, 1)$?

What is the rejection region if we are only willing to risk a probability of .05 of committing a Type I error?

If $\bar{Y} = 17$ and $S = 9$ is Z in the rejection region? What is our conclusion?

The key to these problems when n is large is relying on table 8.1. In these cases we can use the CLT, but oftentimes we have to think about how we can estimate the standard error. For \bar{Y} it makes sense to use the unbiased estimator of S^2 for σ^2 . When we are using the CLT for \hat{p} we have to remember that we calculate the distribution of our test statistic under H_0 . So, under H_0 the best estimate for $\sqrt{\frac{pq}{n}}$ is not $\sqrt{\frac{\hat{p}\hat{q}}{n}}$ but rather $\sqrt{\frac{p_0q_0}{n}}$

For example:

We can do the same sort of problems with other statistics, let's look at problem 10.32. In March 2001, a Gallup poll asked, "How would you rate the overall quality of the environment in this country today?" Of 1060 adults nationwide, 46% said excellent or good. Is this convincing evidence that a majority of the nation's adults think the quality of the environment is fair or poor?

As another example:

The commercialism of the U.S. space program has been a topic of great interest since Dennis Tito paid \$20 million to ride along with the Russian cosmonauts on the space shuttle. In a survey of 500 men and 500 women, 20% of the men and 26% of the women responded that space should be commercial free.

Does statistically significant evidence exist to suggest that there is a difference in the population proportions of men and women who think that space should remain commercial free?

Write out our null hypothesis, alternative hypothesis, and test statistic.

Assuming a .05 level test what is our rejection region.

What is the rejection region in terms of $p_1 - p_2$?