

- d. The publisher decided to run the above hypothesis test at a 1% level of significance. Write couple of sentences to explain why the publisher might choose to run the test at this level of significance instead of a higher value of α . (It may be helpful to think about the meaning of α and β from part (c)).
5. (10pts) A random sample of 144 patients, suffering from a particular disease are given a new medicine. 103 of the patients report an improvement in their condition. The company that manufactures this medicine claims 80% improvement rate. We suspect that it is less than 80%. Let p denote the overall improvement rate of the medicine. Use a confidence interval to test the companies claim at a 5% level of significance. Make sure you give the conclusion like we did in the lecture notes and your conclusion makes sense in the context.
6. (12pts) The manufacturer of a laundry detergent has its machines set to fill jugs according to a normal distribution with a mean of 64 fluid ounces. From time to time, the quality control team will randomly select a sample of jugs and measure their volumes to be sure the machine is filling them to the correct levels. Too much detergent will cause the caps to leak during transport, which leads to angry merchants. Too little detergent leads to angry consumers. If the quality control team believes there is a problem with the machines, it will shut down the entire production line and recalibrate them before continuing. Suppose a recent sample of 16 jugs shows a mean volume of 63.8 fluid ounces with a standard deviation of 0.4 fluid ounces. Test at the 5% significance level if the machines need to be shut down and recalibrated.
7. (8pts) Mrs. N is the manager of a mall. She is reading a report, prepared by the mall's accounting staff which outlines various strategies for increasing mall's income. Included in the report are results from a study on how much customers spend at small kiosks while in the mall. She reads about a "95% confidence interval for the mean spending per customer as being "\$20 \pm \$5".
- Give an interpretation of this interval in the context of this problem.
 - Find two wrong interpretations of the 95% confidence interval Mrs. N. read in her report. And explain in what way those interpretations are wrong. (Make sure that the mistakes in the interpretations are different in nature. Similar natured ones will be counted as one.)
 - While reading the report, she wonders why she has only 95% confidence interval rather than 100% confidence interval. Explain to Mrs. N. why a 100% confidence interval is not useful.
8. (8pts) Calculate α : Assume that in flipping an ordinary coin the probabilities of heads and tails are both $\frac{1}{2}$. Suppose that Mr. G., a coin collector, has a rare dime whose probabilities of heads and tails are $\frac{3}{4}$ and $\frac{1}{4}$, respectively. Imagine that for some reason Mr. G misplaces his rare dime. Later he finds a dime that is identical in appearance and wonders if it is his rare dime. To help him make a decision he sets up a test of hypotheses.

$$H_o : p = \frac{3}{4}$$

$$H_1 : p \neq \frac{3}{4}$$