

STAT 217

More practice questions for Review

Note: Just because something is not asked on the review does not mean that it will not be asked on the Midterm!!

- An electrical company tested a new type of oil to be used in its transformers. Twenty-five readings of dielectric strength were obtained. Dielectric strength is the potential (in kilovolts per centimetre of thickness) necessary to cause a disruptive discharge of electricity through an insulator. The results of the test gave $\bar{x} = 77\text{kv}$, $s = 8\text{kv}$.
 - Find a 95% confidence interval for the mean dielectric strength of the oil. [73.6976, 80.3024]
 - The old transformer oil had a mean dielectric strength of 75 kv. Would you conclude that the new oil has a higher mean dielectric strength of the basis of your answer in part (a)
- A journal article stated that a random sample from a population gave a sample standard deviation of $s = 30$ and a 95% confidence interval for the population mean μ as lying between 18.58 and 26.42.
 - What is the point estimate for μ ? [22.5]
 - What is the maximum error of estimate? [3.92]
 - What is the sample size? [225]
- A study of 75 lakes in Massachusetts indicated that 82% of these lakes may, at some point, be affected by acid rain. Assume that there are a large number of lakes in Massachusetts and that the sample can be considered random.
 - Find a 95% confidence interval for the proportion of lakes in Massachusetts that may at some point be affected by acid rain. [0.7313, 0.9087]
 - What is the maximum error of estimate? [0.0887]
- A population is claimed to have a mean of 13. To test this claim, a sample of size 85 is taken which yields a sample mean of 13.7 and a sample standard deviation of 4.8.
 - Can you conclude at the $\alpha = 0.05$ significance that the population mean is in fact greater than 13? Set up the appropriate test procedure. [1.3445, AHo]
 - What is the p-value of the test in part (a) above? [0.0901]
 - What is the probability of a type II error in the test in part (a) if the true value of the mean is 13.5? [0.7517]
- A machine is designed to fill boxes with an average of 24 grams of material. A sample of 15 boxes is taken which yields a sample variance of 0.008 grams.
 - At the 5% significance level, can you conclude that 0.008 is significantly lower than the known population variance of 0.011? [10.1818, AHo]
 - Find a 95% confidence interval for the population variance of the weights of boxes [0.004288, 0.019897]
- Hugh, the manager of a paint store, wants to estimate the mean amount of a product sold per day. Twenty business days are monitored, and an average of 32 litres is sold daily. The sample standard deviation is 12 litres. Calculate the confidence limits at the 95% confidence level. [26.3839, 37.6161]
- A preliminary sample of 512 Denver County employees was questioned in a study in the American Journal of Public Health to assess the prevalence of symptoms attributed to the work environment. Forty-five employees reported experiencing eye irritation. How large a random sample is needed to be 90 percent confident of being within 3 percent of the population percent of those who experience eye irritation? Comment on the result. [242, Since the preliminary study has 512 employees in the sample, there is already sufficient data to construct a confidence interval within the required tolerance.]
- A patent Medicine company supervisor assumes that the bottling machine is operating properly if 5 percent or less of the processed bottles are not full. A random sample of 100 bottles had 7 bottles that weren't full.
 - Using a significance level of 0.01, conduct a test to see if the machine is operating properly. [$Z = .92$, Aho]
 - At what levels of significance would you conclude that the machine is not operating properly? [$\alpha > .1788$]
- Milk obtained from cows has an average fat composition of 4.0 percent. Thirty-one days of data on the difference in the percent of fat from the monthly average is obtained. The mean is .52% with a standard deviation of .2613. Assuming the population is normally distributed, use the data to see if the population standard deviation of these differences exceeds 0.1. Use a 5% significance level. [$\chi^2_{\text{critical}} = 43.8$, $\chi^2 = 204.83$, $df = 30$, RHo]

10. The length of time customers at Shop N Pay must wait in line before they can leave the checkout station with their purchases is measured. For a random sample of 7 customers, the sample variance is 17.84 min² with a mean of 6.2 minutes. The competition down the street, Buy Fair, uses a different type of checkout system. The length of time 25 customers wait in line at Buy Fair is measured and the variance is 15.93min² with a mean of 5.1 minutes. Assuming these times are normally distributed, test the hypothesis at the 0.10 level that the average time for the competition is less than that for Shop N Pay.

[Fcrit= .3984, 3.84, Fcalc = .8429, Aho, t crit = -1.301, tcalc = -.6369, df = 30, Aho]

Review class notes, assignments 1, 2 and 3, as well as quizzes 1 -3 for the midterm. Practice more questions from the text book.

Questions 6.24-6.52, 7.1 -7.90, 8.1-8.125, 9.1-9.115 note: they use $df = \frac{\left(\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2} \right)^2}{\frac{\left(\frac{s_1^2}{n_1} \right)^2}{(n_1 - 1)} + \frac{\left(\frac{s_2^2}{n_2} \right)^2}{(n_2 - 1)}}$

instead of $df = (\text{smaller of } n_1 \text{ and } n_2) - 1$