

STATISTICS 211
Assignment #5

Review assignment 4 on confidence intervals, normal approximation to Binomial and the t-distribution.

1. A random sample of 41 quarters has a mean weight of 5.622g and SD+ of 0.068g.
 - (a) Construct a 98.12% confidence interval estimate of the population mean of all quarters in circulation.
 - (b) The U.S. Department of the Treasury claims that it mints quarters to yield a mean weight of 5.640g. Is this claim consistent with the confidence interval? Explain why.
2. Maximum heart rates during automated snow removal: sample size =10, sample average =124, SD+=18. Find the 95% confidence interval estimate of the population mean for those who use the electric snow thrower.
3. Because a proposed survey is time-consuming, an enterprising pollster posts it on the Internet and promises free software to everyone who responds by completing the survey. Results include 2250 responses, and 80% of them indicate that a fax machine is owned. Construct a 95% confidence interval for the percentage of all people who have a fax machine. Are the results valid? Why or why not?
4. A random survey of 850 CEOs in Canada showed 700 respondents have a Blackberry. Based on those results, construct a 98% confidence interval for the percentage of all CEOs in Canada who **do not** have a Blackberry.
5. An economist claims that the unemployment rate for non-English speaking people is at least 30% in a specific region of the country. In a random sample of 400 non-English-speaking people in this region 90 were found to be unemployed. Determine a 95% confidence interval estimate of the proportion of non-English-speaking people in the region that are unemployed. Do these data support the economist's claim? Explain why or why not.
6. A patio building company believes that it takes 27 days on average to complete a job. If the job is done in less time, the owner is afraid that the job may be rushed and will sacrifice quality. Records of fifty completed jobs are randomly selected. The mean length of job was found to be 25.3 days with a standard deviation of 2.1 days (SD+). Do records indicate that the mean length of a job is not 27 days as believed by Noah? Set up the appropriate hypothesis test.
7. Industrial espionage is a growing problem. It has been estimate that corporate extortion costs companies more than \$3.35 million on average. Sixty-five cases of this nature were examined and found to average \$3.71 million with a standard deviation of \$1.21 million (SD+). Do the data support the statement concerning the estimated cost of corporate extortion? Set up the appropriate hypothesis test.
8. The owner of a small publishing firm thinks that business has improved lately. Last year the daily revenue for the firm was \$5,000 on average. A random sample of 20 recent days reveals an average daily revenue of \$5,200 with a SD+ = \$507. Do the data support the owner's belief? Set up the appropriate hypothesis test.
9. A cereal manufacturer sells boxes of cereal that list the weight as 19 oz. A random sample of 60 boxes had an average fill of 19.2 oz with SD+= 0.67 oz.
 - (a) Would this data indicate that the actual mean fill of all boxes of this cereal differs from the weight listed on the box?
 - (b) Find the p-value.

10. Big Burger claims that their deluxe special has at least 0.25 pounds of beef on average. A sample of 100 burgers made by this company had a mean of 0.237 pounds of beef with SD+ of 0.06. Is Big Burger guilty of false advertising?
11. A supervisor assumes that the bottling machine is operating properly if at most 5 percent of the processed bottles are not full. A random sample of 100 bottles had 7 bottles that weren't full. Conduct a test to see if the machine is operating properly.
12. In a survey of 1002 people, 701 said that they were against the war in Iraq. Test to see if this is significantly higher than the survey done a year early where 65% were against the war in Iraq.
15. Business schools A and B reported the following summary of GMAT verbal scores for samples of students.

	N	avg	SD+
A	110	37.75	6.67
B	130	33.74	6.68

16. Two marathon training procedures are tried for comparison purposes. Their efficacy is to be determined in a marathon race. Assume race times are normally distributed and variances are not equal. The following results were observed:

	No. In sample	mean race time	SD+ of race times
Procedure 1	150	150 min	12 min
Procedure 2	260	154 min	15 min

Test that procedure 1 is better than procedure 2.

17. The government of Canada wanted to find out if Quebec and Ontario had the same percentage of adults who owned their own company between the ages of 24 and 32. A random sample of 300 people were taken from Ontario and they found that 150 of them owned their own company. In Quebec, in a random sample of 200 they found 80 owned their own business. Is this difference due to chance alone? Carry out the appropriate hypothesis test.
18. Suppose that during late March, the government instituted policies designed to lower the unemployment rate. We want to test whether the policies were effective. In March, in a random sample of 1000 people, 75 were unemployed. During August, in an independent random sample of 1000 people, 65 were unemployed. What is your conclusion?
19. Beth wants to see if a die is weighted. She records the number of times that a number comes up out of 60 throws. She records the following data:

Value	frequency
1	12
2	8
3	15
4	9
5	10
6	6

Is the die weighted? Carry out the appropriate test procedure.

20. An official of a plastics industry claimed that the industry employed 30% white women, 5% minority women, 50% white men, and 15% minority men. To test the claim, an affirmative action committee randomly sampled 150 employees and obtained the following information:

Category	observed
White females	40
Minority females	15
White males	80
Minority males	15

Test the official's claim.

21. A shipment of assorted nuts is labeled as having 45% walnuts, 20% hazelnuts, 20% almonds, and 15% pistachios. By randomly picking several scoops of nuts from this shipment, an inspector find the following counts.

	Walnuts	Hazelnuts	Almonds	Pistachios	Total
Counts	92	69	32	42	235

Could these findings be a strong basis for an accusation of mislabeling?

22. A personnel administrator provided the following data as an example of hiring to fill 12 positions from among 40 male and 40 female applicants.

Applicant	Selected	Not Selected	Total
Male	7	33	40
Female	5	35	40

Does this sample indicate a selection bias in favour of males?

23. Applicants for public assistance are allowed an appeals process when they feel unfairly treated. At such a hearing, the applicant may choose self-representation or representation by an attorney. The appeal may result in an increase, decrease, or no change of the aid recommendation. Court records of 320 appeals cases provided the following data.

Type of Representation	Amount of Aid		
	Increased	Unchanged	Decreased
Self	59	108	17
Attorney	70	63	3

Are the patterns of the appeals decision significantly different between the two types of representation?

24. Review chapters from previous tutorial and chapters 26, 27 and 28.