

Final Exam

1. A courier service advertises that its average delivery time is less than 7 hours for local deliveries. A random sample of times for 20 deliveries to an address across town was recorded. These data are shown here. The sample mean was 620 with sample standard deviation of 1.48. Is this sufficient evidence to support the courier's advertisement, at the 10% level of significance?
2. A manufacturer of doorknobs has a production process that is designed to provide a doorknob with a target diameter of 3 inches. In the past, the standard deviation of the diameter has been 0.035 inch. In an effort to reduce the variation in the process, various studies have resulted in a redesigned process. A sample of 20 doorknobs produced under the new process indicates a sample standard deviation of 0.025 inch. At the 0.1 level of significance, is there evidence that the population standard deviation is less than 0.035 inch in the new process?
3. A student majoring in accounting is trying to decide on the number of firms to which he should apply. Given his work experience and grades, he can expect to receive a job offer from 70% of the firms to which he applies. The student decides to apply to only four firms. What is the probability that he receives no job offers?
4. **Use Big Hairy Spider Data**
Is fear of spiders specific to real spiders or will pictures of spiders evoke similar levels of anxiety? Twelve subjects were asked to play with a big hairy tarantula with big fangs and an evil look in its eight eyes and at a different point in time were shown only pictures of the same spider. The participants' anxiety was measured in each case. Do a test with the significance level of 0.01 to see whether anxiety is higher for real spiders than pictures. We have 12 subjects who were exposed to a picture of a spider (Picture u1) and on a separate occasion a real live tarantula (Real u2). Their anxiety was measured in each condition (half of the participants were exposed to the picture before the real spider while the other half were exposed to the real spider first).
5. How much money does a typical family of four spend at McDonald's restaurant per visit? The amount is a normally distributed random variable with a mean of \$16.40 and a standard deviation of \$2.75. Find the probability that a family of four spends more than \$10.

6. It is known that the amount of time needed to change the oil on a car is normally distributed with a standard deviation of 5 minutes. The amount of time to complete a random sample of 10 oil changes was recorded and listed here. Compute the 99% confidence interval estimate of the mean of the population.
11 、 10 、 16 、 15 、 18 、 12 、 25 、 20 、 18 、 24
7. A company claim that 10% of the users of a certain sinus drug experience drowsiness. In clinical studies of this sinus drug, 81 of the 900 subjects experienced drowsiness. A competitor wants to test the claim and show the actual percentage is not 10%. Is there enough evidence at the 5% significance level to infer that the competitor is correct? What is your conclusion?
8. The time it takes for a statistics professor to mark his midterm test is normally distributed with a mean of 4.8 minutes and a standard deviation of 1.3 minutes. There are 60 students in the professor's class. What is the probability that he needs more than 5 hours to mark all the midterm tests?
9. Mystic Pizza in Mystic, Connecticut, advertises that they deliver your pizza within 15 minutes of placing an order or it is free. A sample of 25 customers is selected at random. The average delivery time in the sample was 13 minutes with a sample standard deviation of 4 minutes.
 - a. We want to know whether Mystic can make this claim or not. Test to determine if we can infer at the 5% significance level that the population mean delivery time is less than 15 minutes.
 - b. Estimate the population mean with 90% confidence.
10. Suppose we randomly select 5 cards without replacement from an ordinary deck of playing cards. What is the probability of getting exactly 2 red cards (i.e., hearts or diamonds)?(There are 52 cards in a deck, a deck of cards has a total of 26 red cards.)

11. Use Score data

After many years of teaching, a statistics professor computed the variance of the marks on her final exam and found it $\sigma^2 = 250$. She recently made changes to the way in which the final exam is marked and wondered whether. A random sample of this year's final exam marks are listed here. Using the data that she collected, can the professor infer at the 10% significance level that the variance has decreased?

12. Use book data

One of my pet hates is 'pop psychology' books. They usually spout nonsense that is unsubstantiated by science and give psychology a very bad name. As part of my plan to rid the world of popular psychology I did a little experiment. I took two groups of people who were in relationships and randomly assigned them to one of two conditions. One group read the famous popular psychology book *The Social Animal*(book1), whereas another group read *Marie Claire*(book2). I tested only 10 people in each of these groups, and the dependent variable was an objective measure of their happiness with their relationship after reading the book. Based on the data that I collected, analyze it with the appropriate test in the significance level of 0.05 and provide your suggestion to me.

13. A psychologist was interested in exploring whether or not male and female college students have different driving behaviors. The particular statistical question she framed was as follows:

Is the fastest speed driven by male college students different than the fastest speed driven by female college students? The psychologist conducted a survey of a random sample 34 male college students and a random sample 29 female college students. Here is a descriptive summary of the results of her survey:

Males (X)	Females (Y)
$n = 34$	$m = 29$
$\bar{x} = 105.5$	$\bar{y} = 90.9$
$s_x = 20.1$	$s_y = 12.2$

Is there sufficient evidence at the $\alpha = 0.05$ level to conclude that the variance of the fastest speed driven by male college students differs from the variance of the fastest speed driven by female college students?

14. The number of students who seek assistance with their statistics assignments is Poisson distributed with a mean of two per day. What is the probability that no student seeks assistance tomorrow?