1. A chef in a restaurant that specializes in pasta dishes was experiencing difficulty in getting brands of pasta to be al dente-that is, cooked enough so as not to feel starchy or hard but still feel firm when bitten into. She decided to conduct an experiment in which two brands of pasta, one American and one Italian, were cooked for either 4 or 8 minutes. The variable of interest was weight of the pasta because cooking the pasta enables it to absorb water. Pasta with a faster rate of water absorption may provide a shorter interval in which the pasta is al dente, thereby increasing the chance that it might be overcooked. The experiment was conducted by suing 150 grams of uncooked pasta. Each trial began by bringing a pot containing 6 quarts of cold, unsalted water to a moderate boil. The 150 grams of uncooked pasta was added and then weighed after a given period of time by lifting the pasta from the pot via a built-in strainer. The results (in terms of weight in grams) for two replicates of each type of pasta and cooking time are stored as follows:

Cooking Time (minutes)

Type of Pasta 4 8

American 265 310

American 270 320

Italian 250 300

Italian 245 305

At the 0.05 level of significance,

1. Is there an interaction between the type of pasta and cooking time?
2. Is there an effect due to type of pasta?
3. Is there an effect due to cooking time?
4. A hospital conducted a study of the waiting time in its emergency room. The hospital has a main campus and three satellite locations. Management had a business objective of reducing waiting time for emergency room cases that did not require immediate attention. To study this, a random sample of 15 emergency room cases that did not require immediate attention at each location were selected on a particular day, and the waiting time (measured from check-in to when the patient was called into the clinic area) was measured. The results were stored in attachment ER waiting.
	1. At the 0.05 level of significance, is there evidence of a difference in the mean waiting times in the four locations?
	2. If appropriate, determine which locations differ in mean waiting time.
5. Some people enjoy the anticipation of an upcoming product or event and prefer to pay in advance and delay the actual consumption/delivery date. In other cases, people do not want a delay. An article in the Journal of Marketing Research reported on an experiment in which 50 individuals were told that they had just purchased a ticket to a concert and 50 were told that they had just purchased a personal digital assistant (PDA). The participants were then asked to indicate their preferences for attending the concert or receiving the PDA. Did they prefer tonight or tomorrow, or would they prefer to wait two or four weeks? The individuals were told to ignore their schedule constraints in order to better measure their willingness to delay the consumption/delivery of their purchase. The following table gives partial results of the study:

Concert PDA

Tonight or tomorrow 28 47

Two to four weeks 22 03

 50 50

 a. What proportion of the participants would prefer delaying the date of the concert?

 b. What proportion of the participants would prefer delaying receipt of a new PDA?

 c. Using the 0.05 level of significance, is there evidence of a significant difference in proportion willing to delay the date of the concert and the proportion willing to delay receipt of a new PDA?

4. In tough economic times, magazines and other media have trouble selling advertisements. Thus, one indicator of a weak economy is a reduction in the number of magazine pages devoted to advertisements. The file Ad Pages (attached) contains the number of pages devoted to advertisements in May 2008 and May 2009 for 12 men’s magazines.

a. At the 0.05 level of significance, is there evidence that the mean number of pages devoted to advertisements in men’s magazines was higher in May 2008 than in May 2009?

1. The industrial settings, alternative methods often exist for measuring variables of interest. The data in Measurement (attachment) (coded to maintain confidentiality) represent measurements in-line that were collected from an analyzer during the production process and from an analytical lab.
	1. At the 0.05 level of significance, is there evidence of a difference in the mean measurements in-line and from an analytical lab?
2. Digital cameras have taken over the majority of the point-and-shoot camera market. One of the important features of a camera is the battery life, as measured by the number of shots taken until the battery needs to be recharged. The file “Digital Camera” (attached) contains the battery life of 29 subcompact cameras and 16 compact cameras.
	1. Assuming that the population variances from both types of digital cameras are equal, is there evidence of a difference in the mean battery life between the two types of digital cameras (alpha = 0.05)?
	2. Determine the p-value in (a) and interpret its meaning.
3. A problem with a telephone line that prevents a customer from receiving or making calls is disconcerting to both the customer and the telephone company. The file “phone” contains samples of 20 problems reported to two different offices of a telephone company and the time to clear these problems (in minutes) from the customers’ lines:

Central Office I Time To Clear Problems (minutes)

1.48 1.75 0.78 2.85 0.52 1.60 4.15 3.97 1.48 3.10

1.02 0.53 0.93 1.60 0.80 1.05 6.32 3.93 5.45 0.97

Central Office II Time To Clear Problems (minutes)

7.55 3.75 0.10 1.10 0.60 0.52 3.30 2.10 0.58 4.02

3.75 0.65 1.92 0.60 1.53 4.23 0.08 1.48 1.65 0.72

 a. Assuming that the population variances from both offices are equal, is there evidence of a difference in the mean waiting time between the two offices? (Use alpha = 0.05)

b. Find the p-value in (a) and interpret its meaning.

1. One of the biggest issues facing e-retailers is the ability to reduce the proportion of customers who cancel their transactions after they have selected their products. It has been estimated that about half of the prospective customers cancel their transactions after they have selected their products. Suppose that a company changed its Web site so that customers could use a single-page checkout process rather than multiple pages. A sample of 500 customers who had selected their products were provided with the new checkout system. Of these 500 customers, 210 cancelled their transactions after they had selected their products.
	1. At the 0.01 level of significance, is there evidence that the population proportion of customers who select products and then cancel their transaction is less than 0.50 with the new system?
	2. Suppose that a sample of n=100 customers (instead of n=500 customers) were provided with the new checkout system and that 42 of those customers cancelled their transactions after they had selected their products. At the 0.01 level of significance, is there evidence that the population proportion of customers who select products and then cancel their transaction is less than 0.50 with the new system?
	3. Compare the results of (a) and (b) and discuss the effect that sample size has on the outcome, and, in general, in hypothesis testing.
2. In a recent year, the FCC reported that the mean wait for repairs for ATT customers was 25.3 hours. In an effort to improve this service, suppose that a new repair service process was developed. This new process, used for a sample of 100 repairs, resulted in a sample mean of 22.3 hours and a sample standard deviation of 8.3 hours.
	1. Is there evidence that the population mean amount is less than 25.3 hours? (Use a 0.05 level of significance.)
	2. Determine the p-value and interpret its meaning.
3. In NY state, saving banks are permitted to sell a form of life insurance called SBLI. The approval process consists of underwriting……During a period of one month, a random sample of 27 approved policies is selected, and the total processing time, in days, is recorded (and stored in “Insurance”):

73 19 16 64 28 28 31 90 60 56 31 56 22 18

45 48 17 17 17 91 92 63 50 51 69 16 17

1. In the past, the mean processing time was 45 days. At the level of0.05 level of significance, is there evidence that the mean processing time has changed from 45 days?
2. The manager of a paint supply store wants to determine whether the mean amount of paint contained in 1-gallon cans purchased from a nationally known manufacturer is actually 1 gallon. You know from manufacturer’s specifications that the standard deviation of the amount of paint is 0.02 gallon. You select a random sample of 50 cans, and the mean amount of paint per 1-gallon can is 0.995 gallon.
	1. Is there evidence that the mean amount is different from 1.0 gallon (use alpha =0.01)?
	2. Compute the p-value and interpret its meaning.
	3. Construct a 99% confidence interval estimate of the population mean amount of paint.
	4. Compare the results of (a) and (c). What conclusions do you reach?