

1. (5 points) [Job Prospects](#) An opinion poll asks an SRS of 100 college seniors how they view their job prospects. In all, 53 say “Good.” The plus four 95% confidence interval for estimating the proportion of all college seniors who think their job prospects are good is

- A.  $0.529 \pm 0.098$ .
- B.  $0.529 \pm 0.096$ .
- C.  $0.529 \pm 0.049$ .

2. (5 points) The 2009 National Assessment of Educational Progress (NAEP) gave a mathematics test to a random sample of eighth-graders in Texas. The mean score was 287 out of 500. To give a confidence interval for the mean score of all Texas eighth-graders, you would use

- A. the matched pairs  $t$  interval.
- B. the one-sample  $t$  interval.
- C. the two-sample  $t$  interval.

3. (5 points) A 2010 study finds that in a random sample of 3000 American adults aged 18 and over, 1410 owned an MP3 player such as an iPod. How many American adults aged 18 and over must be interviewed to estimate the proportion who own MP3 players within  $\pm 0.02$  with 99% confidence? Use 0.5 as the conservative guess for  $p^*$

- A.  $n = 4148$
- B.  $n = 1692$
- C.  $n = 2401$

4. (5 points) [Job Prospects](#) An opinion poll asks an SRS of 100 college seniors how they view their job prospects. In all, 53 say “Good.” The sample survey actually called 130 seniors, but 30 of the seniors refused to answer. This nonresponse could cause the survey result to be in error. The error due to nonresponse

- A. is in addition to the margin of error found in the [Job Prospects](#) Exercise
- B. can be ignored because it isn't random.
- C. is included in the margin of error found in the [Job Prospects](#) Exercise

5. (20 points) Businesses know that customers often respond to background music. Do they also respond to odors? One study of this question took place in a small pizza restaurant in France on two Saturday evenings in May. On one of these evenings, a stimulating lemon odor was spread through the restaurant. On the other evening, no scent was used. When a lemon odor was present, customers lingered for these times:

78	88	108	104	74	75	73	94	63	60
96	94	112	83	56	88	105	97	108	91
88	90	113	97	101	83	89	106		

Here are the times in minutes that customers spent in the restaurant when no odor was present:

103	85	107	68	69	98	79	73	92	106
87	107	72	109	93	121	115	118	92	91
87	84	84	101	72	76	75	92	96	86

(a) Examine both samples. Does it appear that use of two-sample  $t$  procedures is justified? Do the sample means suggest that a lemon odor changes the average length of stay?

(b) Does a lemon odor influence the length of time customers stay in the restaurant? State hypotheses, carry out a  $t$  test, and report your conclusions.

6. (20 points) Plain type fonts such as Times New Roman are easier to read than fancy fonts such as Gigi. A group of 25 volunteer subjects read the same text in both fonts. (This is a matched pairs design. One-sample procedures for proportions, like those for means, are used to analyze data from matched pairs designs.) Of the 25 subjects, 17 said that they preferred Times New Roman for Web use. But 20 said that Gigi was more attractive.

(a) Because the subjects were volunteers, conclusions from this sample can be challenged. Show that the sample size condition for the large-sample confidence interval is not met, but that the condition for the plus four interval is met.

(b) Give a 95% confidence interval for the proportion of all adults who prefer Times New Roman for Web use. Give a 90% confidence interval for the proportion of all adults who think Gigi is more attractive.

7. (20 points) Hallux abducto valgus (call it HAV) is a deformation of the big toe that often requires surgery. Doctors used X-rays to measure the angle (in degrees) of deformity in 38 consecutive patients under the age of 21 who came to a medical center for surgery to correct HAV. The angle is a measure of the seriousness of the deformity. Here are the data:

28 32 25 34 38 26 25 18 30 26 28 13 20  
21 17 16 21 23 14 32 25 21 22 20 18 26  
16 30 30 20 50 25 26 28 31 38 32 21

A good way to judge the effect of an outlier is to do your analysis twice, once with the outlier and a second time without it. The data above follow a Normal distribution quite closely except for one patient with HAV angle 50 degrees, a high outlier.

- (a) It is reasonable to regard these patients as a random sample of young patients who require HAV surgery?
- (b) Find the 95% confidence interval for the population mean based on the 38 patients who remain BEFORE you drop the outlier.
- (c) Find the 95% confidence interval for the population mean based on the 37 patients who remain AFTER you drop the outlier. Compare your interval in (b) with this interval. What is the most important effect of removing the outlier?

8. (20 points) An NHANES report gives data for 654 women aged 20 to 29 years. The mean BMI of these 654 women was  $\bar{x} = 26.8$ . On the basis of this sample, we want to estimate the mean BMI  $\mu$  in the population of all 20.6 million women in this age group. Assume that the population standard deviation is known to be  $\sigma = 7.5$ .

(a) Give a 95%  $z$  confidence interval using the above information.

(b) In fact, the sample data had a sample standard deviation  $s = 7.42$ . What is the 95%  $t$  confidence interval for the mean BMI of all young women?