1. (a) Female bladder capacity is Normally distributed with $\mu = 400$ ml and $\sigma = 75$ ml. Draw this density. Place the points $\mu \pm \sigma$ in their proper location along the curve. (b) Consider a sample mean $\bar{x}$ based on an SRS of $n = 4$ from this population. Calculate $\sigma_{\bar{x}}$. Superimpose this distribution on the drawing of the curve you created in part *a*. Why is $\sigma_{\bar{x}}$ one-half the value of σ?

For the remainder of problems identify (a) the **response variable** and say whether it is quantitative or categorical, (b) the **sample type** as single, matched, or two-independent, (c) the **population**, (d) the **parameter(s)** being inferred, and (e) the **estimate(s)** for the parameters. Then proceed with a **4 step process** for the problem.

2. A professor asked his Junior-level undergraduate students "How many drinks do you typically have at a party?" (A drink is defined as 12 oz beer, one 4 oz glass of wine, or one 1 oz shot of liquor.) He wants to test whether male students and female students differ in this regard. The table below gives the responses of female and males. Let us regard the sample as an SRS of Juniors at the college. In addition, let us assume the population distributions are approximately Normal.

Females:	1	1	2	2	3	3	4	6	7
Males:	1	2	3	4	4	6	8		

3. The Black Youth Project of the University of Chicago interviewed a random sample of $n = 63$ black young people aged 15 to 25. The survey found that 36 listened to rap music every day. Estimate the proportion of all black young people between the ages of 15 and 25 who listen to rap music daily with 90% confidence.

4. How large a sample would be needed to decrease the margin of error in the former problem down to 3%? Continued to use 90% confidence, and suppose that an educated guestimate for p is 57%. (You do not need to do a four-step process for this problem.)

5. If we required 95% confidence for problem #4, would that increase or decrease the sample size requirement?

6. A study of the religious practices interviewed 116 college professors and 1723 undergraduate students to see if they belonged to an organized religious group. Forty-two of the professors answered in the affirmative; 918 of the students answered affirmatively. We want to test whether the proportion of religious participation differs in the two populations. Assume both groups are SRSs of their respective populations.

7. Take the data from problem 6 and put it into a two-way table.

8. A lab makes four measurements of serum sodium levels of a blood sample and finds these sodium levels (mg/l): 156.4, 155.5, 156.3, 155.8. We assume that these measurements represent an SRS of all possible measurements of this blood sample. We want to know the true sodium level in this blood sample with 99% confidence.

9. Follow-up question from problem 8. What is the standard error of the mean in problem 8? What is the margin of error in problem 8? How large a sample would be needed to reduce the margin of error to 0.1 with 95% confidence? Assume $\sigma = 0.4$.

10. Three students are given an exam before starting a regular study schedule. The results on this first exam are shown below in the BEFORE variable. After completing a regular study schedule, a different test is administered. The results of this second test are displayed in the AFTER variable. Assume these data represent an SRS of students and improvements are Normally distributed. Are the results statistically significant at the $\alpha = .10$ level? .05 level? .01 level?

i	BEFORE	AFTER
1	51	78
2	82	96
3	60	91

11. A clinical trial on the treatment of breast cancer finds that 123 or 213 patients treated with a genetically tailored treatment survive 5 or more years. In contrast, 178 of the 325 patients treated with the standard treatment survived. We want to test whether survival was improved with the genetically tailored treatment.