1. One hundred draws are made at random with replacement from a box.
   (a) If the sum of the draws is 7611, what is their average?
   (b) If the average of the draws is 73.94, what is their sum?
2. A box of tickets averages out to 75, and the standard deviation is 10. One hundred draws are made at random with replacement from this box.
   (a) Find the chance (approximately) that the average of the draws will be in the range 65 to 85.
   (b) Repeat, for the range 74 to 76.
3. One hundred draws will be made at random with replacement from a box of tickets. The average of the numbers in the box is 200. The standard error for the average of the draws is computed, and turns out to be 10. True or false:
   (a) About 68% of the tickets are in the range 190 to 210.
   (b) There is about a 68% chance for the average of the hundred draws to be in the range 190 to 210.
4. You are drawing at random with replacement from a box of numbered tickets.
   (a) The expected value for the average of the _____ equals the average of the _____. Options: draws, box.
   (b) As the number of draws goes up, the standard error for the _____ of the draws goes up but the standard error for the _____ of the draws goes down. Option: average, sum.
5. A box contains 10000 tickets. The numbers on these tickets average out to 50, and the standard deviation is 20.
   (a) One hundred tickets are drawn at random with replacement. The average of these draws will be around _____, give or take _____ or so.
   (b) What if 100 draws are made without replacement.
   (c) What if 100 draws are made without replacement, and there are only 100 tickets in the box.
6. A university has 30000 registered students. As part of a survey, 900 of tgese students are chosen at random. The average age of the sample students turns out to be 22.3 years, and the standard deviation is 4.5 years.
   (a) The average age of all 30000 students is estimated as _____. This estimate is likely to be off by _____ or so.

(b) Find a 95%-confidence interval for the average age of 30000 registered students.

7. The Census Bureau collects information on the housing stock as part of the decennial census. In 2000, for instance, the Bureau found that there were about 105 million occupied housing units in the U.S., one third being rental units. Typical rents varied from about \$400 in Wyoming to about \$800 in Hawaii. (In some urban markets like east-side Manhattan or San Francisco's Nob Hill, of course, rents are much higher.)

   A certain town has 10000 occupied rental units. A local real estate office does a survey of these units: 250 are chosen at random, and the occupants are interviewed. Among other things, the rent paid in the previous month is determined. The 250 sample rents average out to \$568, and the standard deviation is \$385. A histogram is plotted for the sample rents, and does not follow the normal curve.

   (a) If possible, find a 68%-confidence interval for the average rent paid in the previous month on all 10000 occupied rental units in this town. If this is not possible, explain why not.

   (b) True or false, and explain: for about 68% of all the occupied rental units in this town, the rent paid in the previous month was between \$544 and \$592.

   (c) True or false, and explain: if another 2500 occupied rental units were taken at random, there would be about a 68% chance for the new sample average to be in the range \$544 to \$592.

8. Fill in the table below, for draws made at random with replacement from a box with five tickets: labeled "0", "2", "3", "4", "6".

Number of draws	EV for sum of draws	SE for su
25		
100		
400		

9. One hundred draws are made at random with replacement from a box. The average of the box is 3.1.

   (a) True or false: the expected value for the average of the draws is exactly equal to 3.1. If this cannot be determined from the information given, what else do you need to know, and why?

   (b) What is the standard error for the average of the draws? If this cannot be determined from the information given, what else do you need to know, and why?

10. One hundred draws are made at random with replacement from a box. The average of the draws is 3.1.

    (a) The expected value for the average of the draws is _____ 3.1. Fill in the blank using one of the options below, and explain.

i. exactly equal to

ii. estimated from the data as

(b) What is the standard error for the average of the draws? If this cannot be determined from the information given, what else do you need to know, and why?

11. There are three boxes of numbered tickets. The average of the numbers in each box is 200. However, the standard deviation of Box A is 10, of Box B is 20, and of Box C is 40. Now 100 draws are made from Box A, 200 from Box B, and 400 from Box C. The draws are made with replacement. The average of each set of draws is computed. Here they are in scrambled order:

    203.6 198.1 200.4

    (a) Which average comes from which box?

    (b) Could it possibly be otherwise?

    Explain briefly.

12. A utility company serves 50000 househoulds. As part of a survey of customer attitudes, they take a simple random sample of 750 households. The average number of television sets in the sample households turns out to be 1.86, and the standard deviation is 0.80. If possible, find a 95%-confidence interval for the average number of television sets in all 50000 households. If this isn't possible, explain why not.

13. Out of the 750 households in the survey of the previous exercise, 451 have computers. If possible, find a 99.7%-confidence interval for the percentage of all 50000 households with computers. If this isn't possible, explain why not.

14. (Continues the previous exercises.) Out of the 750 households in the survey, 749 have at least one television set. If possible, find a 95%-confidence interval for the percentage of all the 50000 households with at least one television set. If this isn't possible, explain why not.

15. As part of the survey described above, all persons age 16 and over in the 750 sample households are interviewed. This makes 1528 people. On the average, the sample people watched 5.20 hours of television the Sunday before the survey, and the standard deviation was 4.50 hours. If possible find a 95%-confidence interval for the average number of hours spent watching television on that Sunday by all persons age 16 and over in the 50000 households. If this isn't possible, explain why not.

16. One hundred draws are made at random with replacement from a box. The sum of the draws is 297. Can you estimate the average of the box? Can you attach a standard error to your estimate, on the basis of the information given so far? Explain briefly.