Instructions: Answer each question, and when required explain your answer. Your explanation must be clear and complete. You may refer to your book, your notes and your homework papers.

1. Explain how to select a simple random sample of 7 elements from the whole numbers running from 1 to 100, using the table on page 570. What sample do you get? Explain in enough detail that I can verify that your sample is the one you should have gotten.

Answer: Randomly pick a starting entry in the table, say the entry in row 5 column 3. Then read down and pick the last two digits of each entry, skipping an entry if it gives a number already chosen. (If the two digits are 00 then that counts as 100.) Here is the simple random sample I get: 26, 6, 59, 32, 25, 10, 20.

2. Explain how to select a 40% independent sample from the whole numbers running from 1 to 10, using the table on page 570. What sample do you get? Explain in enough detail that I can verify that your sample is the one you should have gotten.

Answer: Randomly pick a starting entry in the table, say the entry in row 2 column 4 (which is 64569). Then read down that column, counting from 1 to 10 as you go. Every time the last two digits of the entry gives a number between 1 and 40 inclusive, the number you counted is selected. The results are given in the following table, where the first column gives the count from 1 to 10, the second column gives the corresponding table entry, the third column gives its last two digits and the fourth column indicates whether we select the number in the first column or not:

1	64569	69	do not select 1
2	17707	07	do select 2
3	60638	38	do select 3
4	93608	08	do select 4
5	78545	45	do not select 5
6	39445	45	do not select 6
7	50784	84	do not select 7
8	33358	58	do not select 8
9	36246	46	do not select 9
10	17068	68	do not select 10

Our 40% independent sample is thus {2, 3, 4}.

3. Do Problem 37 on page 592.

Answer: The book gives a solution on page 920.

4. Consider the data 1, 5, 6, 6, 7, 8, 8, 9, 11, 20.

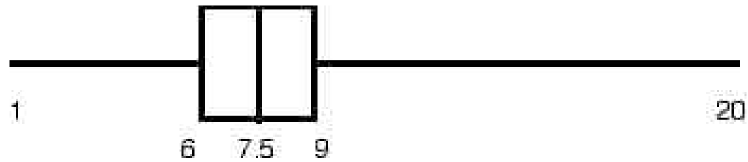
(a) Find the mean of this data: (1+5+6+6+7+8+8+9+11+20)/10 = 8.1

(b) Find the median of this data: take the middle data value if there is one, else average the two middle values, which in this case are 7 and 8 so the median is (7+8)/2 = 7.5.

(c) Find the mode(s) of this data: 6 and 8, since they occur the most often.

(d) Find the range of this data: 20-1=19

(e) Create and label a box and whisker plot of this data: the five number summary is the minimum, 1, the first quartile, 6, the median, 7.5, the third quartile, 9, and the maximum, 20.



(f) Find the sample standard deviation of this data: the variance is [(1-8.1)2+(5-8.1)2+(6-8.1)2+(6-8.1)2+(7-8.1)2+(8-8.1)2+(8-8.1)2+(9-8.1)2 +(11-8.1)2+(20-8.1)2]/(10-1) = 24.544, so the sample standard deviation is the square root of this, or about 4.95.

5. Suppose ACT scores in a particular year are approximately normally distributed with
mean 20 and standard deviation of 6.

(a) What z value does 29 represent?
Answer: An ACT score of 29 is 9 points above the mean. Since σ is 6, this is 1.5σ. Since z is just the number times σ that the score is above or below the mean, and since 29 is 1.5σ above the mean, we see z = 1.5. Note: when the score is below the mean, z is negative. So an ACT of 17 gives z = −0.5.

(b) Use the table on page 709 to determine the proportion of test-takers that receive a 29 or better on the ACT test.
Answer: The proportion of test takers between the mean of 20 and 1.5σ above the mean is 43.32% according to the table. Since 50% are above the mean, there are 50 − 43.32 = 6.68% above 1.5σ. In other words, 6.68% receive scores of 29 or better.

(c) What ACT score must you get if 69.15% of test-takers received a higher score?
Answer: Note that to have 69.15% of test takers receive better scores than you, you're in the bottom half, so you must have gotten a score below the mean. Thus the percentage of test takers that got scores between your score and the mean of 20 is 69.15 − 50 = 19.15%. The table value for 0.1915 is z = 0.5; i.e., (1/2)σ below the mean, or 20 − (1/2)6 = 20 − 3 = 17. So you must have gotten a score of 17.

6. An American Research Group poll of a nationwide random sample of 2,104 likely voters was conducted by telephone March 2-5, 2007. It showed Clinton 42% and McCain 45% (with 10% Undecided). Determine a 95% confidence interval for the 45% McCain figure. Show how
you compute your answer.

Answer: Since n = 2104, and p^ = 0.45, we get s^ =
interval is just the interval ranging from 2s^ below p^ to 2s^ above p^. I.e., the confidence interval is 0.45 ± .0216 or 42.84% to 47.16%.

7. Problem 27 on p. 741.

Answer: Assuming a 95% confidence interval, the margin of error of 4% means that the standard error is half that, or 2%, so s^ = 0.02. But using the formula s^ = (p^(1-p^)/n)^(1/2) and given that p^ = 39%, we get 0.02^2 = (0.39*0.61/n) so n = 0.39*0.61/0.02^2 = 594.75 which rounds to 595.