Assignment, Chapter 1

1.

Do women study more than men? Here are the number of minutes that 30 women and men responded that they study.

Women					Men				
180	120	180	360	240	90	120	30	90	200
120	180	120	240	170	90	45	30	120	75
150	120	180	180	150	150	120	60	240	300
200	150	180	150	180	240	60	120	60	30
120	60	120	180	180	30	230	120	95	150
90	240	180	115	120	0	200	120	120	180

a) Examine the data. Why are you not surprised that most responses are multiples of 10 minutes? One student was excluded because they claimed to study 300, 000 minutes a night. Are there any other responses that you consider suspicious?
b) Make a back to back stem plot of these data. Report the approximate midpoints of both groups. Does it appear that women study more than men?

Answers

- The distribution is bimodal (there are two peaks).
- Most of the ACT states are located in the upper portion of the distribution, since in such states, only the strongest students take the SAT.

2. A Survey of study Habits and Attitudes was given to a sample of 18 first year college women. Their scores are:

154	109	137	115	152	140	154	178	101
103	126	126	137	165	165	129	200	148

It was also administered to 20 first year college men. Their scores are:

108	140	114	91	180	115	126	92	169	146
109	132	75	88	113	151	70	115	187	104

a) Make a back to back stem plot of the men's and women's scores. The overall shapes of the distributions are indistinct as often happens when only a few observations are available. Are there any outliers?
b) Compare the midpoints and the ranges of the two distributions. What is the most noticeable contrast between the female and male scores?

Answers

- Men | | Women

Men		Women
50	7	
8	8	
21	9	
984	10	139
5543	11	5
6	12	669
2	13	77
60	14	08
1	15	244
9	16	55
	17	8
70	18	
	19	
	20	0

a) There seems to be an outlier amongst the women, with the score of 200
b) The women's median is 138.5; range is 99 (101 to 200). The men's median is 114.5; range is 117 (70-187). Generally women have higher scores.

3. Here are the scores on the Survey of Study Habits and Attitudes for 18 first year college women:

154	109	137	115	152	140	154	178	101
103	126	126	137	165	165	129	200	148

And 20 first year men:

108	140	114	91	180	115	126	92	169	146
109	132	75	88	113	151	70	115	187	104

a) Make a back to back stem plot of these data.
b) Find the mean and the median for both sets of scores. What feature of each distribution explains the fact that mean is greater than the median?
c) Find the five numbered summaries for both sets of SSHA scores. Your plot in a) suggests that there is an outlier among the women's scores. Does the 1.5 X I Q R criterion flag this observation? Make side by side box plots for the two distributions.
d) Use your results to write a brief comparison of the two groups. Do women as a group score higher than men? Which of your descriptions show this? Which group of scores is more spread out when we ignore outliers? Which of your descriptions shows this most clearly?

Answers:

a) Same stemplot as in question 1.2

b) Women M = 138.5

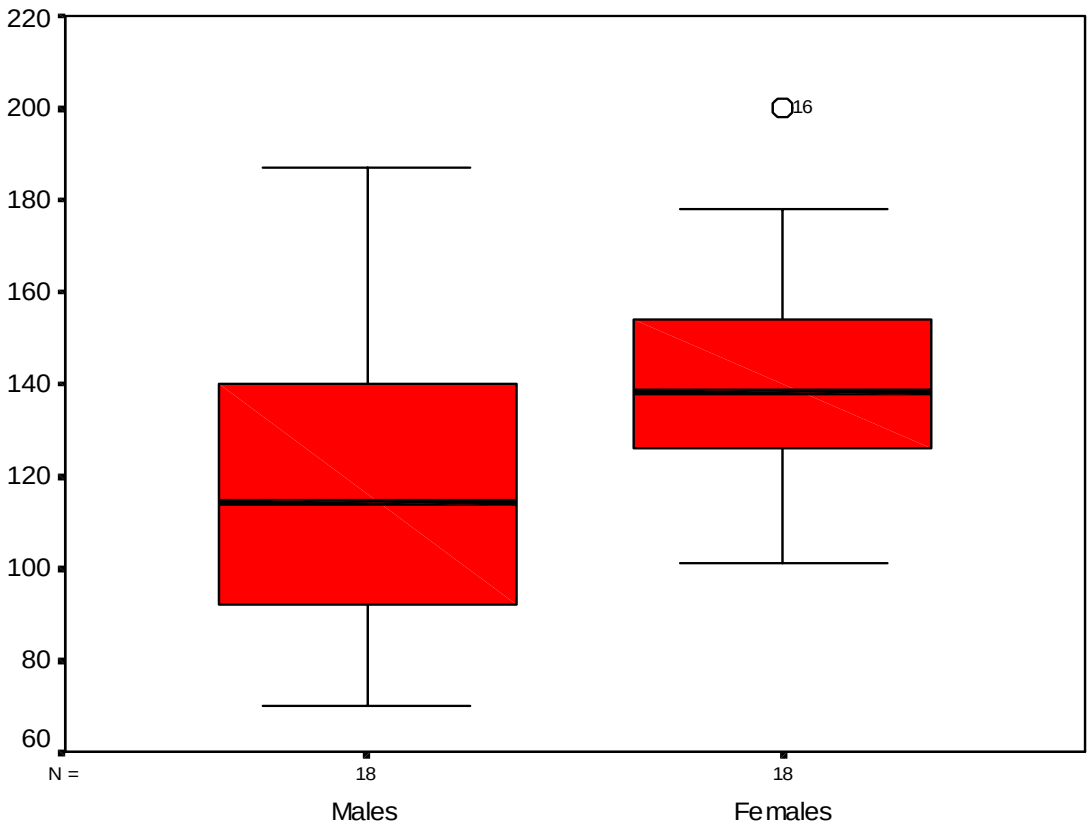
$\overline{X} = 141.06$

c) Men M = 114.5

$\overline{X} = 121.25$

- The reason that the mean is larger than the median is because both data sets are skewed to the right.

- BOX PLOT


220
200
180
160
140
120
100
80
60
16
N =
18
18
Males
Females

Five Number Summary

Women	101	126	138.5	154	200
Men	70	98	114.5	143	187

- The IQR x 1.5 criterion flags the women's score of 200 as an outlier
- Women tend to score higher on the SSHA
- Men's scores are more spread out

4. Using your Z chart, a calculator or software, find the proportion of observations from the standard normal distribution that satisfies each of the following statements. In each case sketch a standard normal curve.

a) Z < 2.85
b) Z > 2.85
c) Z > -1.66
d) –1.66 < Z < 2.85

Answers

a) p = 0.9978
b) p = 0.0022
c) p = 0.9515
d) p = 0.9493

5. The scores of a reference population on the WISC are normally distributed with mu = 100 and standard deviation of 15.

a) What percent of this population have WISC scores below 100?
b) Below 80?
c) Above 140?
d) Between 100 and 120?

Answers

a) 50%
b) p = 0.0918 or 9.18 %
c) p = 0.0038 or 0.38%
d) p = 0.4082 or 40.82%

6. The distribution of scores on the WISC is described in the previous question. What score will place a child in the top 5% of the population? The top 1%?

Answers

a)

$$z = \frac{x - \mu}{\sigma}$$

$x = z(\sigma) + \mu$

$x = 1.64\ (15) + 100$

$x = 124.6$, You need a score of 125 to score in the top 5%

b) $x = z(\sigma) + \mu$

$x = 2.326\ (15) + 100$

$x = 134.89$, You need a score of 135 to score in the top 1%