1.   Question Details   DevoreStat9 1.E.014. [3210877]

The accompanying data set consists of observations on shower-flow rate (L/min) for a sample of n = 129 houses:

4.6	12.2	7.1	7.0	4.0	9.2	6.7	6.9	11.5	5.1
11.2	10.5	14.3	8.0	8.8	6.4	5.1	5.6	9.6	7.5
7.5	6.2	5.8	2.8	3.4	10.4	9.8	6.6	3.7	6.4
8.3	6.5	7.6	9.3	9.2	7.3	5.0	6.3	13.6	6.2
5.4	4.8	7.5	6.0	6.9	10.8	7.5	6.6	5.0	3.3
7.6	3.9	11.9	2.2	15.0	7.2	6.1	15.3	18.3	7.2
5.4	5.5	4.3	9.0	12.7	11.3	7.4	5.0	3.5	8.2
8.4	7.3	10.3	11.9	6.0	5.6	9.5	9.3	10.4	9.7
5.1	6.7	10.2	6.2	8.4	7.0	4.8	5.6	10.5	14.6
10.8	15.5	7.5	6.4	3.4	5.5	6.6	5.9	15.0	9.6
7.8	7.0	6.9	4.1	3.6	11.9	3.7	5.7	6.8	11.3
9.3	9.6	10.4	9.3	6.9	9.8	9.1	10.6	4.5	6.2
8.3	3.2	4.9	5.0	6.0	8.2	6.3	3.8	6.0	

(a) Construct a stem-and-leaf display of the data. (Enter numbers from smallest to largest separated by spaces. Enter NONE for stems with no values.)

Stems	Leaves
2	2 8
3	2 3 4 4 5 6 7 7 8 9
4	0 1 3 5 6 8 8 9
5	0 0 0 0 1 1 1 4 4 5 5 6 6 6 7 8 9
6	0 0 0 0 1 2 2 2 2 3 3 4 4 4 5 6 6 6 7 7 8 9 9 9 9
7	0 0 0 1 2 2 3 3 4 5 5 5 5 5 6 6 8
8	0 2 2 3 3 4 4 8
9	0 1 2 2 3 3 3 3 5 6 6 6 7 8 8
10	2 3 4 4 4 5 5 6 8 8
11	2 3 3 5 9 9 9
12	2 7
13	6
14	3 6
15	0 0 3 5
16	NONE
17	NONE
18	3

(b) What is a typical, or representative, flow rate?

[   ] 🔑 7 L/min

(c) Does the display appear to be highly concentrated or spread out?

◯ highly concentrated, except for a few values on the negative side

◯ highly concentrated in the middle

◯ spread out

◯ 🔑 highly concentrated, except for a few values on the positive side

(d) Does the distribution of values appear to be reasonably symmetric? If not, how would you describe the

departure from symmetry?

- ○ Yes, the distribution appears to be reasonably symmetric.
- ○ 🔑 No, the data are skewed to the right, or positively skewed.
- ○ No, the data are skewed to the left, or negatively skewed.
- ○ No, the distribution of the values appears to be bimodal.

(e) Would you describe any observation as being far from the rest of the data (an outlier)?

- ○ Yes, the value 2.2 appears to be an outlier.
- ○ Yes, the value 15.5 appears to be an outlier.
- ○ 🔑 Yes, the value 18.3 appears to be an outlier.
- ○ No, none of the observations appear to be an outlier.

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2.   Question Details   DevoreStat9 1.E.045. [3210870]

Suppose the value of Young's modulus (GPa) was determined for cast plates consisting of certain intermetallic substrates, resulting in the following sample observations:

116.9   115.7   114.8   115.2   115.5

(a) Calculate $\bar{x}$.

[   ] 🔑 115.62 GPa

Calculate the deviations from the mean. (Enter your answers to two decimal places.)

x	116.9	115.7	114.8	115.2	115.5
deviation	[ ] 🔑 1.28	[ ] 🔑 0.08	[ ] 🔑 -0.82	[ ] 🔑 -0.42	[ ] 🔑 -0.12

(b) Use the deviations calculated in part (a) to obtain the sample variance and the sample standard deviation. (Round your answers to three decimal places.)

$s^2 =$ [   ] 🔑 0.627 GPa^2

$s\ \ =$ [   ] 🔑 0.792 GPa

(c) Calculate s^2 by using the computational formula for the numerator S_{xx}. (Round your answer to three decimal places.)

[   ] 🔑 0.627 GPa^2

(d) Subtract 100 from each observation to obtain a sample of transformed values. Now calculate the sample variance of these transformed values. (Round your answer to three decimal places.)

[   ] 🔑 0.627 GPa^2

Compare it to s^2 for the original data.

- ○ The variance in part (d) is greater than the variance in part (b).
- ○ 🔑 The variance in part (d) is equal to the variance in part (b).
- ○ The variance in part (d) is smaller than the variance in part (b).

3.   Question Details   DevoreStat9 1.E.055. [3887384]

A sample of 26 offshore oil workers took part in a simulated escape exercise, resulting in the accompanying data on time (sec) to complete the escape. Here is a stem-and-leaf display of escape time data.

| stem	leaf
32	55
33	49
34	
35	6699
36	34469
37	03345
38	9
39	2347
40	23
41	
42	9

(a)   Determine the value of the fourth spread.

☐   🔑 33

(b)   Are there any outliers in the sample? Any extreme outliers?

⦿ There is one extreme outlier and several outliers.

⦿ There is one extreme outlier and one outlier.

⦿ There are no extreme outliers but several outliers.

⦿ There are several extreme outliers.

⦿ 🔑 There are no outliers or extreme outliers.

(c)   Construct a boxplot.
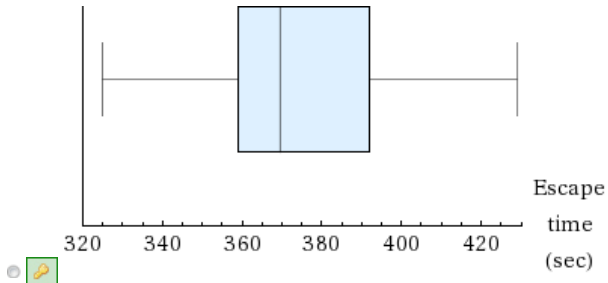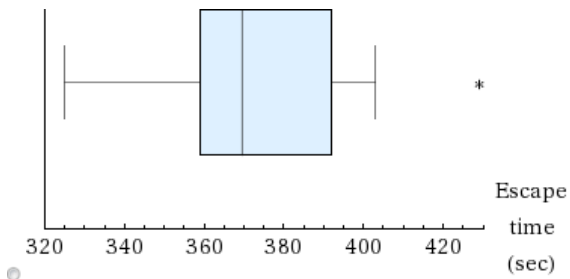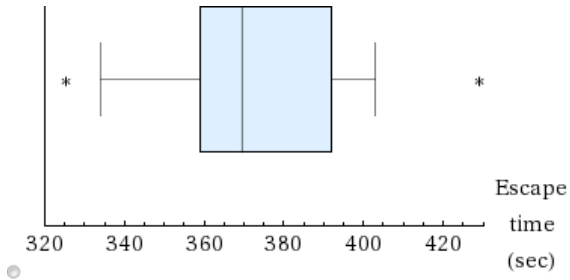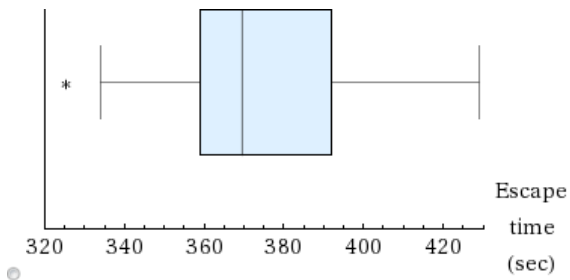
Comment on its features.

- ⊙ The distribution is roughly symmetric with several outliers.
- ⊙ The distribution is positively skewed with several outliers.
- ⊙ The distribution is roughly bimodal with no outliers.
- ⊙ 🔑 The distribution is roughly symmetric with no outliers.
- ⊙ The distribution is negatively skewed with several outliers.

(d)   By how much could the largest observation, currently 429, be decreased without affecting the value of the fourth spread?

    [   ] 🔑 37 sec

4.   Question Details   DevoreStat9 1.E.039. [3210879]

The propagation of fatigue cracks in various aircraft parts has been the subject of extensive study in recent years. The accompanying data consists of propagation lives (flight hours/10^4) to reach a given crack size in fastener holes intended for use in military aircraft.

0.744	0.841	0.880	0.900	0.929	0.942	0.960	1.010
1.040	1.040	1.091	1.124	1.138	1.168	1.227	1.361

(a) Compute and compare the values of the sample mean $\bar{x}$ and median $\tilde{x}$. (Round your answers to four decimal places.)

$\bar{x}$ = _____   🔑 1.0247   flight hours/10^4

$\tilde{x}$ = _____   🔑 1.0250   flight hours/10^4

(b) By how much could the largest sample observation be decreased without affecting the value of the median? (Enter your answer to three decimal places.)

_____   🔑 0.321   flight hours/10^4

5.   Question Details   DevoreStat9 1.E.508.XP. [3210643]

Consider the following observations on shear strength (MPa) of a joint bonded in a particular manner.

21.4   40.4   16.4   73.4   36.6   109.0

30.0   4.4   33.1   66.7   81.5

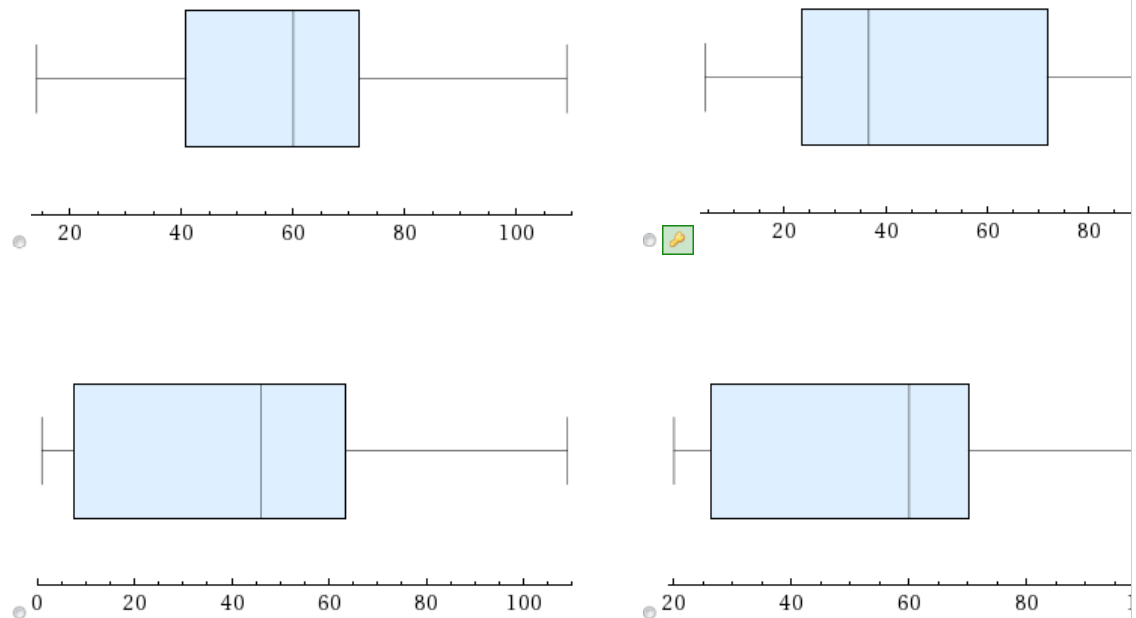(a) What are the values of the fourths? (Enter your answers to two decimal places.)

lower fourth   [   ]   🔑 25.70   MPa
upper fourth   [   ]   🔑 70.05   MPa

What is the value of f_s?

[   ]   🔑 44.35   MPa

(b) Construct a boxplot based on the five-number summary.

Comment on its features. (Select all that apply.)

☐ 🔑 There is a slight positive skew to the data.

☐ 🔑 There are no outliers.

☐ There is a slight negative skew to the data.

☐ The data is symmetric.

☐ 🔑 The variation seems quite large.

☐ The variation is small.

☐ There are outliers.

(c) How large or small does an observation have to be to qualify as an outlier? (Round your answers to one decimal place.)

below   [   ]   🔑 -40.8   MPa
above   [   ]   🔑 136.6   MPa

How large or small does an observation have to be to qualify as an extreme outlier? (Round your answers to one decimal place.)

below   [   ]   🔑 -107.4   MPa
above   [   ]   🔑 203.1   MPa

(d) By how much could the largest observation be decreased without affecting f_s?

[_____] 🔑 35.6 | MPa

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6.   Question Details   DevoreStat9 1.E.507.XP. [3210818]

An article on pedaling techniques for elite endurance cyclists reported on single-leg power at a high workload.

247   195   163   185   185   177   178

204   212   188   209   181   194   202

(a) Calculate the sample mean $\bar{x}$ and median $\tilde{x}$. (Round your mean to two decimal places.)

$\bar{x}$ = [_____]   🔑 194.29

$\tilde{x}$ = [_____]   🔑 191

Interpret the sample mean and median.

- ⚪ The median is much larger than the mean.

- ⚪ The median is larger than the mean, but they are still fairly close together.

- ⚪ 🔑 The mean is larger than the median, but they are still fairly close together.

- ⚪ The mean is much larger than the median.

(b) Suppose that the first observation had been 253 rather than 247. Calculate the sample mean and median.
(Round your mean to two decimal places.)

$\bar{x}$ = [_____]   🔑 194.71

$\tilde{x}$ = [_____]   🔑 191

How would the mean and median change?

- ⚪ Both the mean and median decreased.

- ⚪ Both the mean and median stayed the same.

- ⚪ 🔑 The mean increased, and the median stayed the same.

- ⚪ The mean decreased, and the median stayed the same.

(c) Calculate a trimmed mean by eliminating the smallest and largest sample observations. (Enter your answer to two decimal places.)

[_____] 🔑 192.50

What is the corresponding trimming percentage? (Round your answer to two decimal places.)

[_____] 🔑 7.14 | %

(d) The article also reported values of single-leg power for a low workload. The sample mean for $n = 13$ observations was $\bar{x} = 119.8$ (actually 119.7692), and the 14th observation, somewhat of an outlier, was 157. What is the value of $\bar{x}$ for the entire sample? (Round your answer to the nearest whole number.)

[_____] 🔑 122