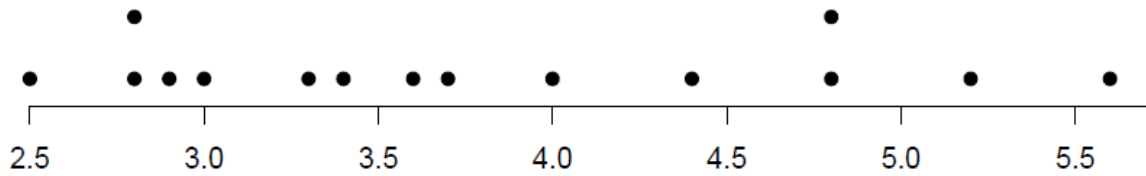
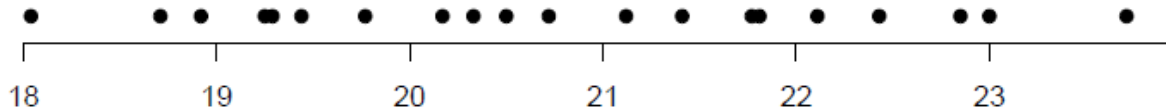


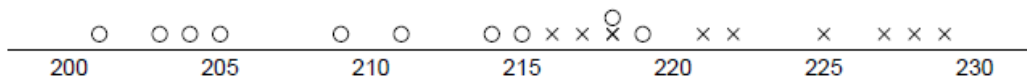
Ex.1.1/d



Ex1.2/C



Ex1.3/a



In the figure, “x” represents the “No aging” group and “o” represents the “Aging” group.

Ex1.3/b

Yes; tensile strength is greatly reduced due to the aging process.

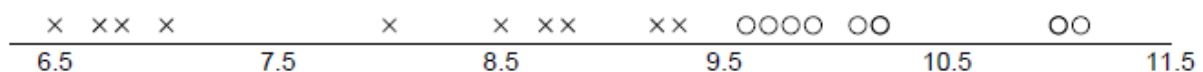
Ex1.3/c

Mean_{Aging} = 209. 90, and Mean_{No aging} = 222. 10.

Ex 1.3/d

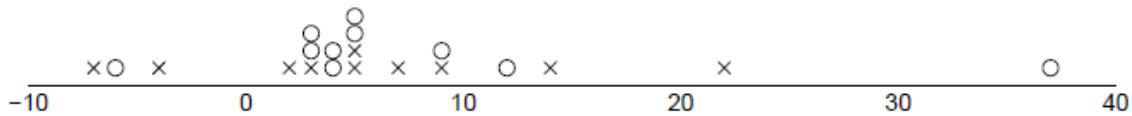
Median_{Aging} = 210. 00, and Median_{No aging} = 221. 50. The means and medians for each group are similar to each other.

Ex1.4/b



In the figure, “x” represents company A and “o” represents company B. The steel rods made by company B show more flexibility.

Ex 1.5/a



In the figure, “x” represents the control group and “o” represents the treatment group.

Ex.1.5/ b

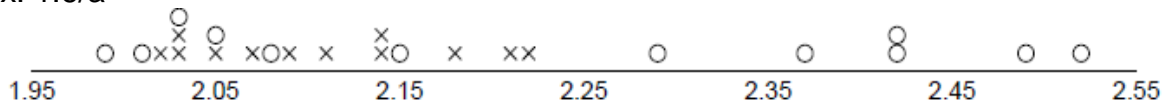
$\bar{X}_{\text{Control}} = 5.60$, $\tilde{X}_{\text{Control}} = 5.00$, and $\bar{X}_{\text{tr}(10);\text{Control}} = 5.13$;

$\bar{X}_{\text{Treatment}} = 7.60$, $\tilde{X}_{\text{Treatment}} = 4.50$, and $\bar{X}_{\text{tr}(10);\text{Treatment}} = 5.63$

Ex.1.5/C

The difference of the means is 2.0 and the differences of the medians and the trimmed means are 0.5, which are much smaller. The possible cause of this might be due to the extreme values (outliers) in the samples, especially the value of 37.

Ex. 1.6/a



In the figure, “x” represents the 20°C group and “o” represents the 45°C group.

Ex.1.6/b

$\bar{X}_{20^\circ\text{C}} = 2.1075$, and $\bar{X}_{45^\circ\text{C}} = 2.2350$.

Ex.1.6/c

high temperature yields more high values of tensile strength, along with a few low values of tensile strength. Overall, the temperature does have an influence on the tensile strength.

Ex.1.6/d

the variation of the tensile strength gets larger when the cure temperature is increased.

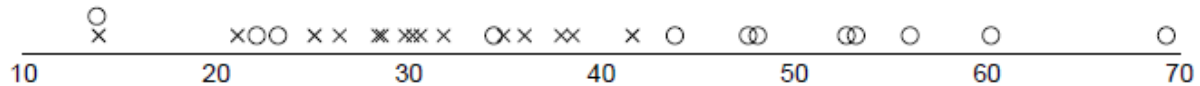
Ex.1.7

$S^2=0.94284$, $S=0.971$.

Ex.1.8

$S^2=2.5345$; $S=1.592$.

Ex. 1.17/c



In the figure, “x” represents the nonsmoker group and “o” represents the smoker group.

Ex. 1.15

Yes. The value 0.03125 is actually a P-value and a small value of this quantity means that the outcome (i.e., HHHHH) is very unlikely to happen with a fair coin.

Ex. 1.16

$$\sum_{i=1}^n x_i - n\bar{x} = \sum_{i=1}^n x_i - \sum_{i=1}^n \bar{x} = 0,$$

Ex. 1.17/d

Smokers appear to take longer time to fall asleep and the time to fall asleep for smoker group is more variable

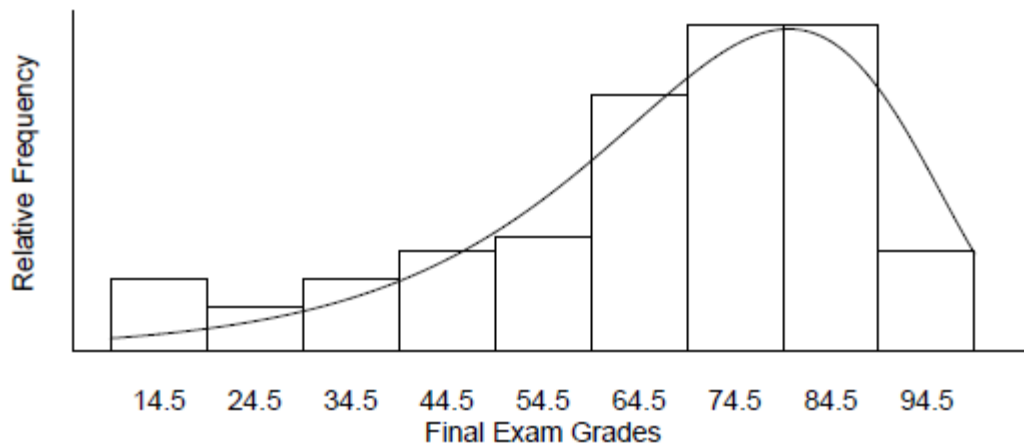
Ex. 1.18/a

Stem	Leaf	Frequency
1	057	3
2	35	2
3	246	3
4	1138	4
5	22457	5
6	00123445779	11
7	01244456678899	14
8	00011223445589	14
9	0258	4

Ex. 1.18/b

Relative Frequency Distribution of Grades

Class Interval	Class Midpoint	Frequency, f	Relative Frequency
10 – 19	14.5	3	0.05
20 – 29	24.5	2	0.03
30 – 39	34.5	3	0.05
40 – 49	44.5	4	0.07
50 – 59	54.5	5	0.08
60 – 69	64.5	11	0.18
70 – 79	74.5	14	0.23
80 – 89	84.5	14	0.23
90 – 99	94.5	4	0.07

Ex.1.18/c**Ex. 1.18/d**

$\bar{X} = 65.48$, $\tilde{X} = 71.50$ and $s = 21.13$.

Ex. 1.19/a

Stem	Leaf	Frequency
0	22233457	8
1	023558	6
2	035	3
3	03	2
4	057	3
5	0569	4
6	0005	4

Ex. 1.19/b

Relative Frequency Distribution of Years			
Class Interval	Class Midpoint	Frequency, f	Relative Frequency
0.0 – 0.9	0.45	8	0.267
1.0 – 1.9	1.45	6	0.200
2.0 – 2.9	2.45	3	0.100
3.0 – 3.9	3.45	2	0.067
4.0 – 4.9	4.45	3	0.100
5.0 – 5.9	5.45	4	0.133
6.0 – 6.9	6.45	4	0.133

EX 1.19/c

$\bar{X} = 2.797$, $s = 2.227$ and $R = 6$.

Ex 1.20/a

Stem	Leaf	Frequency
0*	34	2
0	56667777777889999	17
1*	0000001223333344	16
1	5566788899	10
2*	034	3
2	7	1
3*	2	1

Ex. 1.20/b

Relative Frequency Distribution of Fruit Fly Lives			
Class Interval	Class Midpoint	Frequency, f	Relative Frequency
0 – 4	2	2	0.04
5 – 9	7	17	0.34
10 – 14	12	16	0.32
15 – 19	17	10	0.20
20 – 24	22	3	0.06
25 – 29	27	1	0.02
30 – 34	32	1	0.02

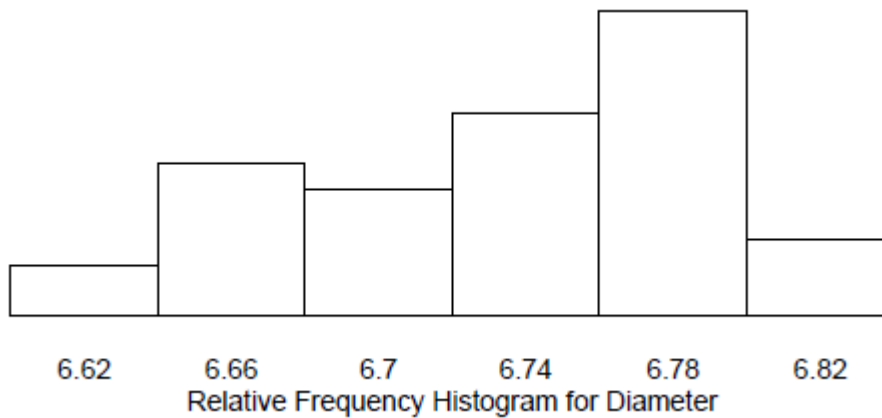
Ex. 1.20/c



Ex. 1.20/d

$$\bar{X} = 10.50$$

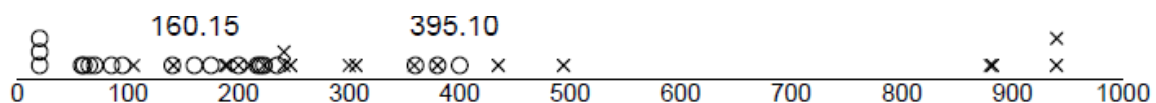
Ex.1.22/b



Ex. 1.22/c

The data is skewed to the left.

Ex. 1.23/a



Ex. 1.23/b

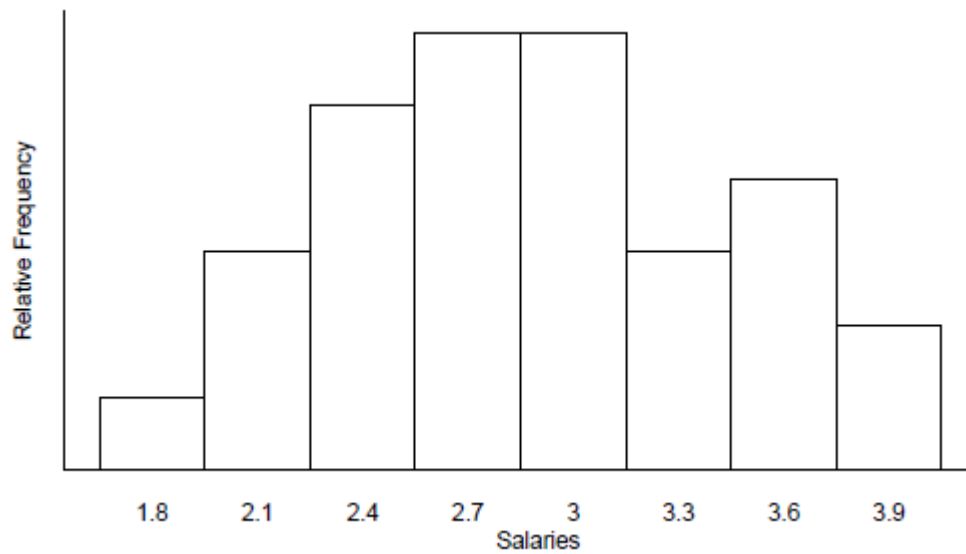
$$\bar{X}_{1980} = 395.1 \text{ and } \bar{X}_{1990} = 160.2$$

Ex. 1.23/c

The sample mean for 1980 is over twice as large as that of 1990. The variability for 1990 decreased also as seen by looking at the picture in (a). The gap represents an increase of over 400 ppm. It appears from the data that hydrocarbon emissions decreased considerably between 1980 and 1990 and that the extreme large emission (over 500 ppm) were no longer in evidence.

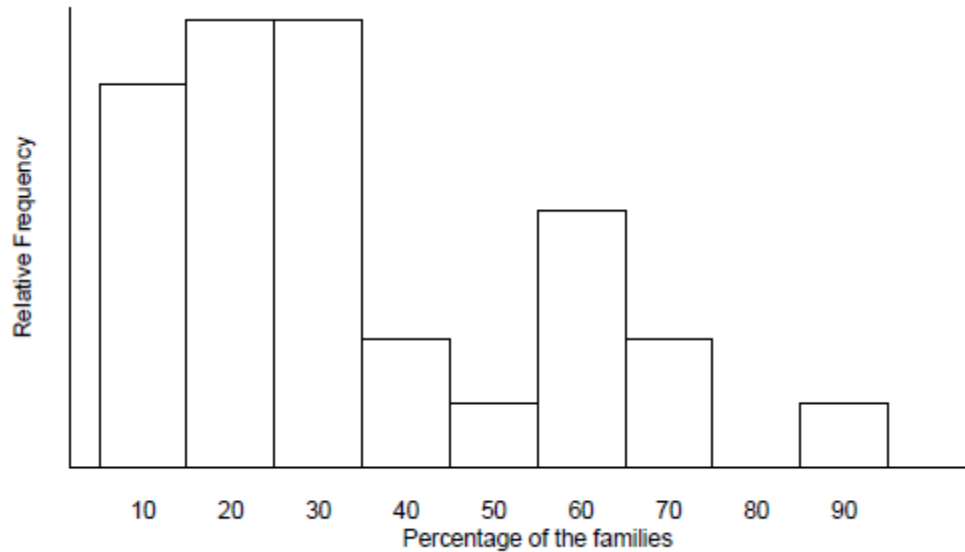
Ex 1.24/a

$\bar{X} = 2.8973$ and $s = 0.5415$

Ex.1.24/b**Ex 1.24/c**

Stem	Leaf	Frequency
1	(84)	1
2*	(05)(10)(14)(37)(44)(45)	6
2	(52)(52)(67)(68)(71)(75)(77)(83)(89)(91)(99)	11
3*	(10)(13)(14)(22)(36)(37)	6
3	(51)(54)(57)(71)(79)(85)	6

Ex 1.25/c



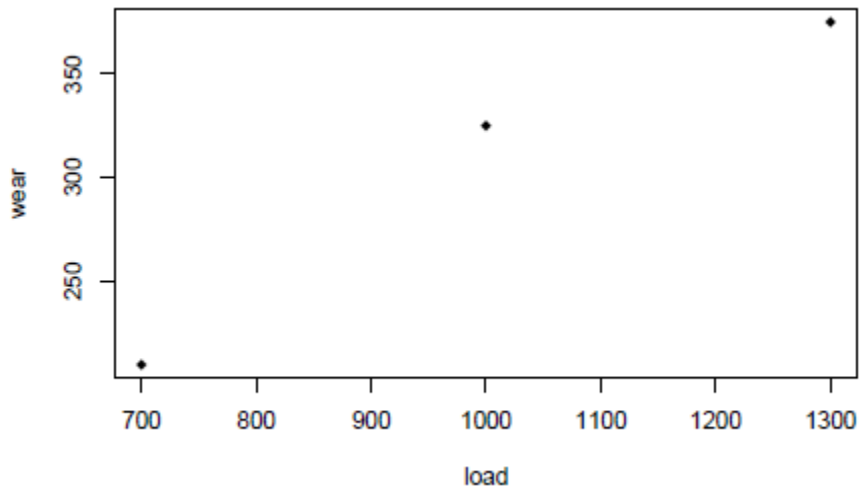
Ex 1.25/d

$\bar{X}_{tr(10)} = 30.97$. This trimmed mean is in the middle of the mean and median using the full amount of data. Due to the skewness of the data to the right (see plot in (c)), it is common to use trimmed data to have a more robust result.

Ex 1.26

If a model using the function of percent of families to predict staff salaries, it is likely that the model would be wrong due to several extreme values of the data. If a scatter plot of these two data sets is made, it is easy to see that some outlier would influence the trend.

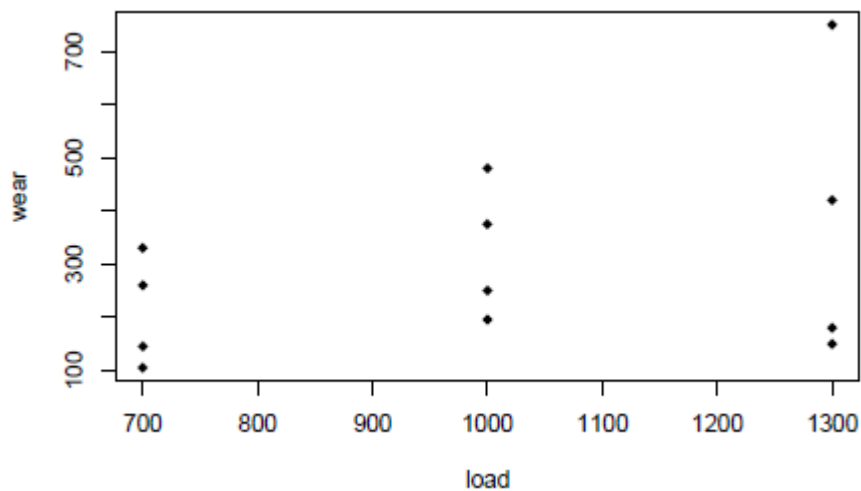
Ex 1.27/a



Ex 1.27/b

When the load value increases, the wear value also increases. It does show certain relationship.

Ex 1.27/c



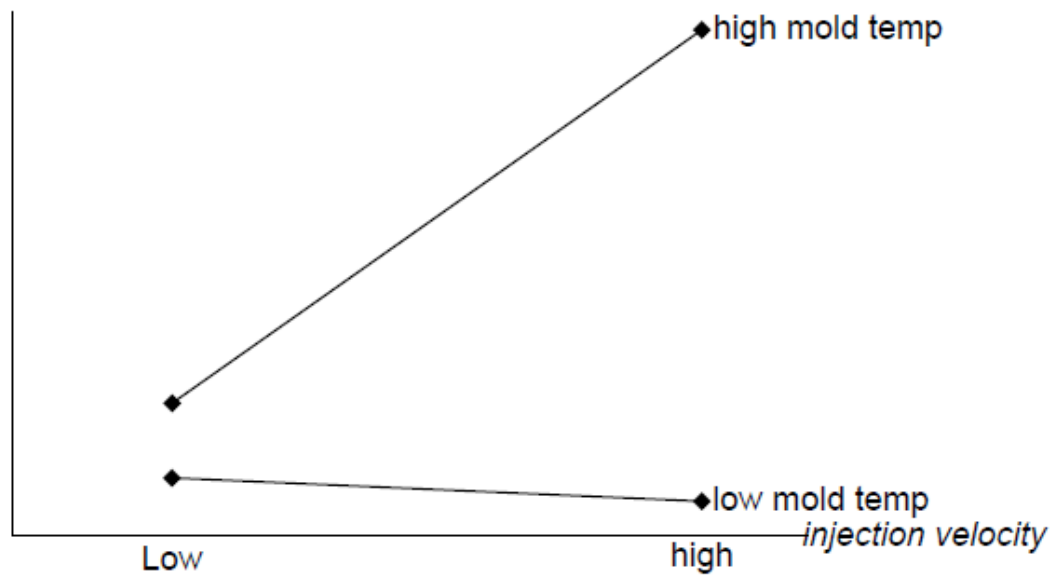
Ex 1.27/d

The relationship between load and wear in (c) is not as strong as the case in (a), especially for the load at 1300. One reason is that there is an extreme value (750) which influence the mean value at the load 1300

Ex. 1.28/a

Ex 1.30

mean shrinkage value



Since in this experimental data, those two variables can be controlled each at two levels, the interaction can be investigated. If the data are from an observational studies, in which the variable values cannot be controlled, it would be difficult to study the interactions among these variables.