

Homework 1 Solutions

Grading: Check the correctness of answers to 6-18 (2 points) and 6-31 (2 points). Then give 6 points for satisfactory answer to the remaining questions. The total is 10 points.

6-8. Sample average:

$$\bar{x} = \frac{\sum_{i=1}^{19} x_i}{19} = \frac{272.82}{19} = 14.359 \text{ min}$$

Sample variance:

$$\sum_{i=1}^{19} x_i = 272.82$$

$$\sum_{i=1}^{19} x_i^2 = 10333.8964$$

$$\begin{aligned} s^2 &= \frac{\sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i\right)^2}{n}}{n-1} = \frac{10333.8964 - \frac{(272.82)^2}{19}}{19-1} \\ &= \frac{6416.49}{18} = 356.47 \text{ (min)}^2 \end{aligned}$$

Sample standard deviation:

$$s = \sqrt{356.47} = 18.88 \text{ min}$$

The sample standard deviation could also be found using

$$s = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$$

where

$$\sum_{i=1}^{19} (x_i - \bar{x})^2 = 6416.49$$

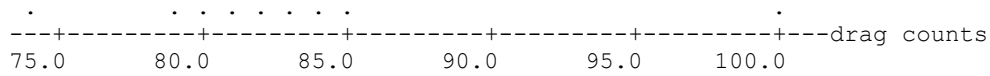
6-18. sample mean $\bar{x} = \frac{\sum_{i=1}^n x_i}{n} = \frac{748.0}{9} = 83.11$ drag counts

$$\text{sample variance } s^2 = \frac{\sum_{i=1}^n x_i^2 - \frac{\left(\sum_{i=1}^n x_i\right)^2}{n}}{n-1} = \frac{62572 - \frac{(748.0)^2}{9}}{9-1}$$

$$= \frac{404.89}{8} = 50.61 \text{ drag counts}^2$$

sample standard deviation $s = \sqrt{50.61} = 7.11$ drag counts

Dot Diagram



6-31. Stem-and-leaf display for cycles to failure: unit = 100 1|2 represents 1200

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1      0T|3
1      0F|
5      0S|7777
10     0o|88899
22     1*|000000011111
33     1T|22222223333
(15)   1F|444445555555555
22     1S|66667777777
11     1o|888899
5      2*|011
2      2T|22

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Median = 1436.5, $Q_1 = 1097.8$, and $Q_3 = 1735.0$

No, only 5 out of 70 coupons survived beyond 2000 cycles.

- 6-38. Sample mean: $\bar{x} = 65.811$ inches, standard deviation $s = 2.106$ inches, and sample median: $\tilde{x} = 66.000$ inches

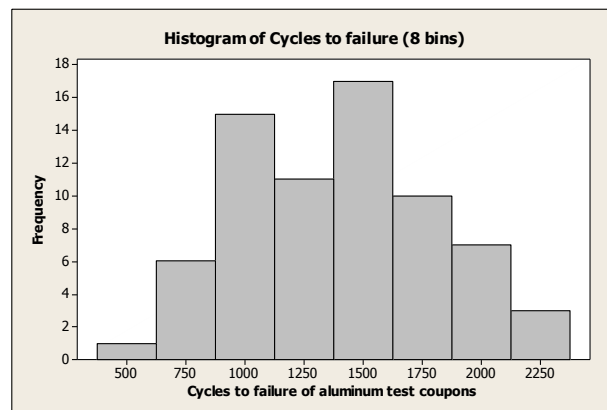
Stem-and-leaf display of female engineering student heights N = 37
 Leaf Unit = 0.10 61|0 represents 61.0 inches

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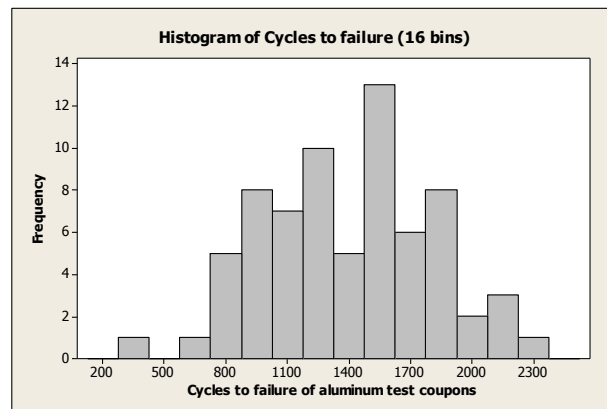
1  61|0
3  62|00
5  63|00
9  64|0000
17 65|00000000
(4) 66|0000
16 67|00000000
8  68|00000
3  69|00
1  70|0

```

- 6-51. Histogram 8 bins:



Histogram 16 bins:



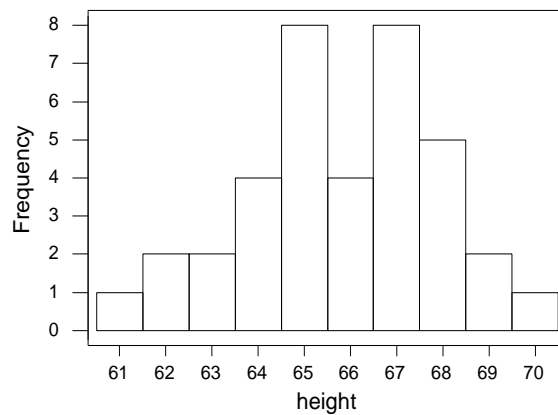
Yes, both of them give the same similar information

6-54.

Frequency Tabulation for Problem 6-30. Height Data

Class	Lower Limit	Upper Limit	Midpoint	Frequency	Relative Frequency	Cumulative Frequency	Cum. Rel. Frequency
at or below		60.500		0	.0000	0	.0000
1	60.500	61.500	61.000	1	.0270	1	.0270
2	61.500	62.500	62.000	2	.0541	3	.0811
3	62.500	63.500	63.000	2	.0541	5	.1351
4	63.500	64.500	64.000	4	.1081	9	.2432
5	64.500	65.500	65.000	8	.2162	17	.4595
6	65.500	66.500	66.000	4	.1081	21	.5676
7	66.500	67.500	67.000	8	.2162	29	.7838
8	67.500	68.500	68.000	5	.1351	34	.9189
9	68.500	69.500	69.000	2	.0541	36	.9730
10	69.500	70.500	70.000	1	.0270	37	1.0000
above	70.500			0	.0000	37	1.0000

Mean = 65.811 Standard Deviation = 2.106 Median = 66.0

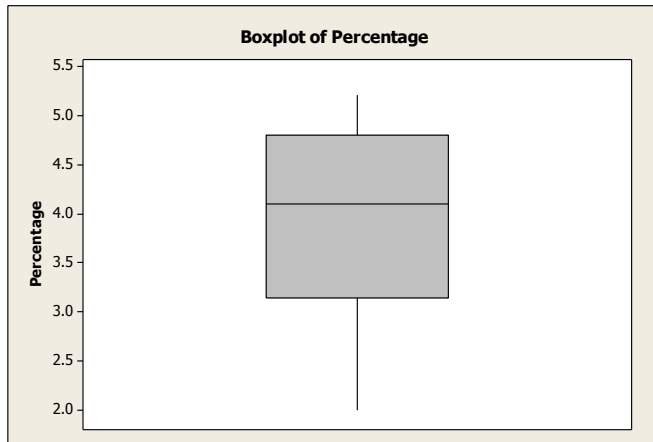


6-70. Descriptive Statistics

Variable	N	Mean	Median	Tr Mean	StDev	SE Mean
PMC	20	4.000	4.100	4.044	0.931	0.208
Variable	Min	Max	Q1	Q3		
PMC	2.000	5.200	3.150	4.800		

a) Sample Mean = 4, Sample Variance = 0.867, Sample Standard Deviation = 0.931

b)

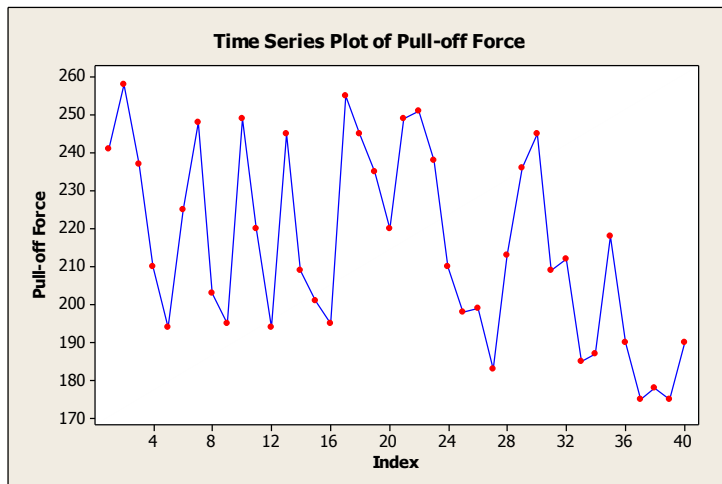


6-83. Stem-and-leaf display for Force: unit = 1 1|2 represents 12

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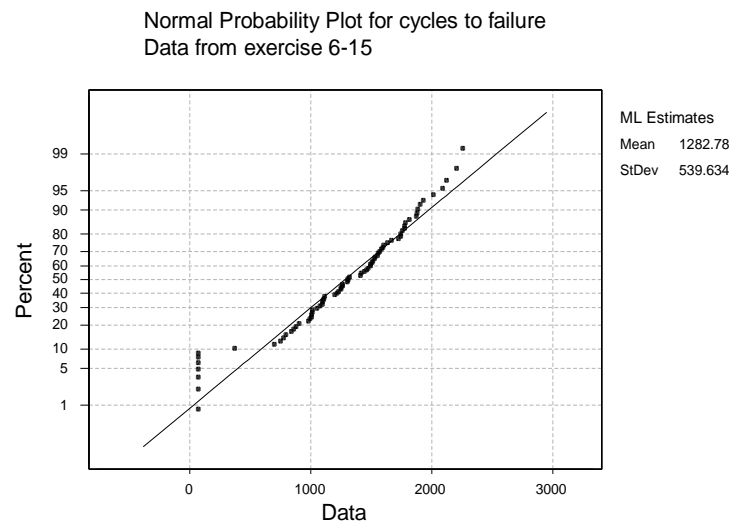
3   17|558
6   18|357
14  19|00445589
18  20|1399
(5) 21|00238
17  22|005
14  23|5678
10  24|1555899
3   25|158

```



In the time series plot there appears to be a downward trend beginning after time 30. The stem-and-leaf plot does not reveal this.

6-99.



The data appear to be approximately normally distributed. However, there are some departures from the line at the ends of the distribution.