Assignment 5

Thursday, June 2, 2022 10:21 PM

Problem #5: Note that this question (along with all other problems that don't have the R symbol beside them) should be done **by hand**.

Consider the following data,

42, 67, 41, 55, 56, 64, 44, 60, 65, 53.

(a) Draw a stem and leaf plot **including depths** using intervals of length 5. (See the bottom of this example for an explanation of depths.) Enter the value of the depths **only** in the answer box below.
For example, if your stem-and-leaf plot looked like the one on at the bottom of this example then you would enter the following numbers into the answer box:
`8, 36, 20, 44, 21, 5, 1`

(b) Calculate the mean.

(c) Calculate the sample variance.

(d) Calculate the range.

41 42 44 53 55 56 60 64 65 67

a.)

Stem	Leaf	Depth
4	1 2 4	3
4*		3
5	3	4
5*	5 6	(2)
6	0 4	4
6*	5 7	2

b.) $\text{mean} = \frac{41+42+44+53+55+56+60+64+65+67}{10} = 54.7$

c.) $s^2 = \frac{187.69 + 161.29 + 114.49 + 2.89 + 0.09 + 1.69 + 28.09 + 86.49 + 106.09 + 151.29}{10-1}$

$= \frac{840.1}{9}$

$= 93.34$

d.) range = max - min = 67 - 41 = 26

Problem #7: Consider the data set that is summarized in the R Output below.

```
leaf unit: 1
       n:13
 1    1  9
 2    2  7
 2    3
 6    4  1237
(4)   5  3367
 3    6  135
```

(a) Find the values of Q_1 and Q_3.

(b) Find the median

(c) Find the adjacent values.
(**Note:** Read this file for the relevant definitions, and for an example.)

(d) Which of the following is a correct modified boxplot for this data set?

19 27 41 42 43 47 53 53 56 57 61 63 65

a.) $Q_1(25^{th}) = \frac{25}{100}(13+1) = 3.5$

$Q_1 = 41 \times 0.5 + 42 \times 0.5 = 41.5$

$Q_3(75^{th}) = \frac{75}{100}(13+1) = 10.5$

$Q_3 = 57 \times 0.5 + 61 \times 0.5 = 59$

b.) median = 53

c.) $IQR = Q_3 - Q_1 = 59 - 41.5 = 17.5$

$1.5(IQR) = 1.5(17.5) = 26.25$

lowest datum $= Q_1 - 1.5(IQR)$

$= 41.5 - 26.25$

$= 15.25$

low adjacent value $\Rightarrow a_2 = 19$

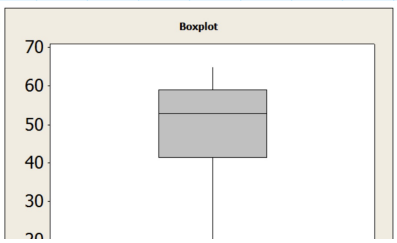
highest datum $= Q_3 + 1.5(IQR)$

$= 59 + 26.25$

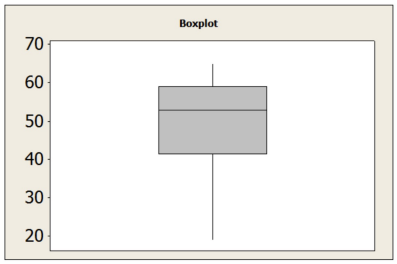
$= 85.25$

high adjacent value $\Rightarrow a_1 = 65$

d.) (H)



d.) (H)



Problem #9: Consider the following data.

26, 26, 31, 36, 31, 37, 23

(a) If you were to construct a normal probability plot by hand for the above data what are the numerical values (in order) of the **first five** numbers that would go on the *x*-axis? Separate your answers with a comma. (See this example for a description of the normal probability plot.)
For example, if your data was the same as this example then you would enter the following numbers from Step 4 (on the last page) into the answer box (note that spaces don't matter):
`4, 4, 7, 7, 9`

(b) If you were to construct a normal probability plot by hand for the above data what are the numerical values (in order) of the **first five** numbers that would go on the *y*-axis? Separate your answers with a comma. (See this example for a description of the normal probability plot.)
For example, if your data was the same as the data on the last page of this example then you would enter the following numbers from Step 4 (on the last page) into the answer box (note that spaces don't matter):
`-1.83, -1.28, -0.97, -0.73, -0.52`

23 26 26 31 31 36 37

$n = 7$

$\alpha_1 = \frac{1-0.5}{7} = 0.07143 \Rightarrow z_1 = -1.47$

$\alpha_2 = \frac{2-0.5}{7} = 0.2143 \Rightarrow z_2 = -0.79$

$\alpha_3 = \frac{3-0.5}{7} = 0.3571 \Rightarrow z_3 = -0.37$

$\alpha_4 = \frac{4-0.5}{7} = 0.500 \Rightarrow z_4 = 0$

$\alpha_5 = \frac{5-0.5}{7} = 0.6429 \Rightarrow z_5 = 0.37$

(23, -1.47) (26, -0.79) (26, -0.37) (31, 0) (31, 0.37)

a.) 23, 26, 26, 31, 31

b.) -1.47, -0.79, -0.37, 0, 0.37

Problem #10: IQs are known to be normally distributed with mean 100 and standard deviation 15. In a random sample of 38 people, find the probability that the average IQ is between 94 and 104.

$M = 100 \qquad \sigma = 15$

$$P(94 \leq X \leq 104) = P(X \leq 104) - P(X \leq 94)$$

$$= P\left(z < \frac{104 - 100}{\frac{15}{\sqrt{38}}}\right) - P\left(z < \frac{94 - 100}{\frac{15}{\sqrt{38}}}\right)$$

$$= P(z < 1.6438) - P(z < -2.4658)$$

$$= 0.94950 - 0.00676$$

$$= 0.94274$$