Abdullah Gul University

Math-301 (Probability & Statistics)

Fall 2022, QUIZ - II

Name & Surname:
ID Number:

Q 1.

(100 pt.)

The measurements in the table below were recorded for the drying time, in hours, of a certain brand of latex paint. Assume that the measurements are a simple random sample. Under that assumption;

**a.** Find the standard deviation for the data shown below? (20 pt)
**b.** Construct a stem-and-leaf plot for the data shown below. (20 pt)
**c.** Construct the box-and-whisker plot for the data shown below. (30 pt)
**d.** Plot the histogram of the data with an interval of 4 hours. (30 pt)

| | | | | |
|---|---|---|---|---|
| 34 | 25 | 48 | 29 | 36 |
| 28 | 33 | 56 | 37 | 28 |
| 44 | 40 | 52 | 30 | 48 |

**SOLUTION:**

**a.** First, the sample mean should be calcullated as below;

Sample size = N= 3x5 = 15

Mean = $\mu = \frac{34+25+48+29+36+28+33+56+37+28+44+40+52+30+48}{N} = \frac{568}{15} \approx 38$

Then, let us apply the formula of the standard devition as below;

$$std = \sqrt{\frac{\sum(X_i - \mu)^2}{N-1}}$$

$$= \sqrt{\frac{(34-38)^2 + (25-38)^2 + (48-38)^2 + (29-38)^2 + \ldots\ldots\ldots + (48-38)^2}{15-1}}$$

$$= \sqrt{\frac{1320}{14}} = 9.7$$

**b.**

| STEM | LEAF |
|---|---|
| 2 | 5889 |
| 3 | 03467 |
| 4 | 0488 |
| 5 | 26 |

**c.** To draw the box & whisker plot, we should sort the measurements and find the medium values at each quarter regions as below;

Sorting:

| | | | | |
|---|---|---|---|---|
| ~~25~~ | ~~28~~ | ~~28~~ | ~~29~~ | ~~30~~ |
| ~~33~~ | ~~34~~ | 36 | ~~37~~ | ~~40~~ |
| ~~44~~ | ~~48~~ | ~~48~~ | ~~52~~ | ~~56~~ |

The medium for the whole data will give us the end of the 2nd quarter:
The sample size is an odd number, so:
Median = $m = x_{(n+1)/2} = 36$

For the end of the 1st quarter, let us focus on the the first half part of the whole data shown below;

| | | | | |
|---|---|---|---|---|
| ~~25~~ | ~~28~~ | ~~28~~ | 29 | ~~30~~ |
| ~~33~~ | ~~34~~ | | | |

For the the first half part of the whole data, the new sample size (7) is an odd number, so:
Median = $m = x_{(n+1)/2} = 29$

For the end of the 3rd quarter, let us focus on the the first half part of the whole data shown below;

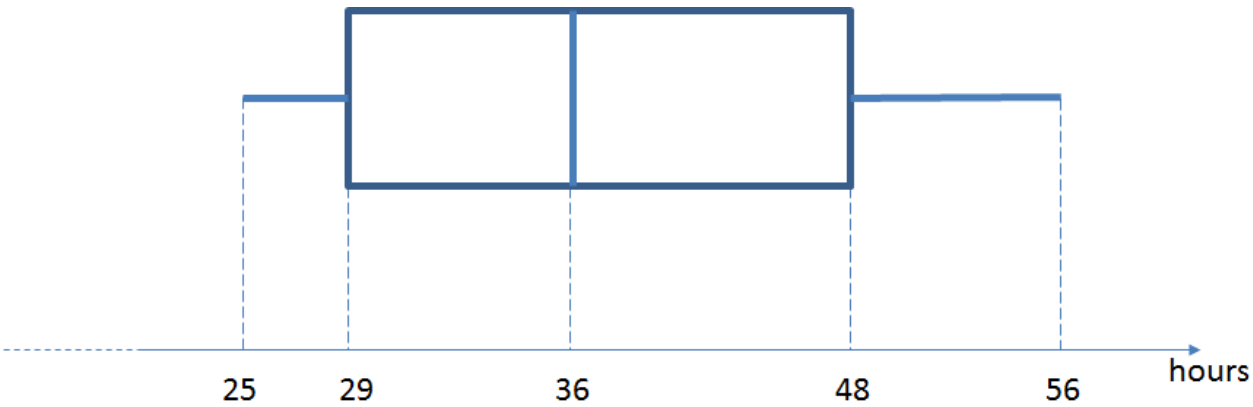
| | | | | |
|---|---|---|---|---|
| ~~37~~ | ~~40~~ | ~~44~~ | 48 | ~~48~~ |
| ~~52~~ | ~~56~~ | | | |

For the the second half part of the whole data, the sample size (7) is an odd number, so:
Median = $m = x_{(n+1)/2} = 48$

To find the starting point of the 1st quarter region; it is equal to the smallest value of the whole data. So, **the starting point of the 1st quarter region is 25**.

To find the end point of the 4th quarter region; it is equal to the largest value of the whole data. So, **the end point of the 4th quarter region is 56**.

NOW, let us draw the box&whisker plot as below;



**d.** To plot the histogram, let us sort the measurements as below;

| | | | | |
|---|---|---|---|---|
| 25 | 28 | 28 | 29 | 30 |
| 33 | 34 | 36 | 37 | 40 |
| 44 | 48 | 48 | 52 | 56 |

By the way, the group interval is given as 4 hours. Then, the group names can be arranged as below for the data;

| | | | |
|---|---|---|---|
| Group-I: from 25 to 28, | 25 | 28 | 28 |
| Group-II: from 29 to 32, | 29 | 30 | |
| Group-III: from 33 to 36, | 33 | 34 | 36 |
| Group-IV: from 37 to 40, | 37 | 40 | |
| Group-V: from 41 to 44, | 44 | | |
| Group-VI: from 45 to 48, | 48 | 48 | |
| Group-VII: from 49 to 52, | 52 | | |
| Group-VIII: from 53 to 56, | 56 | | |

NOW, let us draw the histogram: