Thursday, September 27, 2018
3:51 PM

Statistics Honors Boxplots Practice (Day 4) Name KEY

Using Boxplots to Analyze Data

Your group will be assigned to create a boxplot using specific data from the table below.

Data from Mrs. Dynarski's Statistics Honor's Classes:

Gender	Height (in inches)	Study Time (minutes)
Male	71	0
Female	65	0
Female	65	15
Male	67	5
Female	62	10
Male	72	60
Male	69	10
Female	58	15
Male	70	30
Male	69	20
Female	58	25
Female	66	30
Male	73	30
Male	72	15
Female	65	20
Male	69	10
Female	64	15
Female	60	20
Male	68	10
Male	68	5
Female	62	10
Male	70	10
Male	71	10
Male	65	5
Male	71	10
Female	67	30
Male	70	10
Female	65	45
Male	72	0
Male	71	10
Female	66	20
Female	63	45

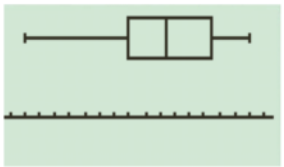
Statistics Honors Boxplots Practice (Day 4) Name _____

Using Boxplots to Analyze Data – GROUP 1

1. Create a modified boxplot using the **entire class' data on height**. Be sure to write down the 5-number summary and to show all work for outliers.

Heights of Students in Mrs. Dynarski's Statistics H. Classes

minX=58
Q1=65
Med=67.5
Q3=70.5
maxX=73



Work for outliers:

IQR = Q3 - Q1
= 70.5 - 65
= 5.5

< Q1 - 1.5 IQR
< 65 - 1.5(5.5)
< 56.75
none

> Q3 + 1.5 IQR
> 70.5 + 1.5(5.5)
> 78.75
none

2. Describe your modified boxplot.

Shape: Skewed to the left
Outliers: none
Center: 67.5
Spread: 58 to 73 inches

3. What do you notice about the median? Why do you think this is?

The median is 67.5 inches or 5' 7½". This is rather high, but there were more boys (18) in the sample than girls (14).

4. What do you notice about the shape? Why do you think this happened?

The data is skewed to the left, meaning that there were less shorter students and more taller students.

One possible explanation is that there were more male students sampled, who tend to be taller.

5. This just in! NBA basketball player Yao Ming has relocated to East Brunswick from Shanghai. He has decided to enroll back into high school to receive his diploma. He is placed in our Statistics Honors class. He is 7 feet and 5 inches tall. What do you think would happen to your boxplot if you added his height to your data set?

(7x12) + 5 = 89

* the maximum would increase to 89 inches.
* 89 inches would be an outlier (>1.5 IQR) and would show up as a dot not attached to a whisker on the plot.

6. How does Yao Ming's height affect the median of your boxplot? Why?

the median would not change very much (68) since the median is resistant to outliers.

7. Would the mean be an appropriate measure of center for this data? Explain your reasoning.

* the mean would not be a good measure of center for this data because it is affected by outliers. (not resistant)
* the extremely high height will increase the mean significantly.

8. Create a modified *side-by-side* boxplot (*one for male and one for females*) using **our class' male and female heights.** Be sure to write down the 5-number summary and to show all work for outliers.

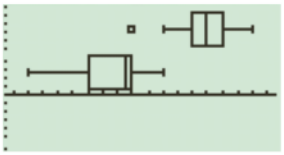
Males

```
1-Var Stats
↑n=18
 minX=65
 Q1=69
 Med=70
 Q3=71
_maxX=73
```

Females

```
1-Var Stats
↑n=14
 minX=58
 Q1=62
 Med=64.5
 Q3=65
 maxX=67
```

Heights of Students in Mrs. Dynarski's Statistics H. Classes



Males
Females

Work for outliers: IQR = Q3 - Q1

Males: = 71 − 69 = 2

< Q1 − 1.5 IQR: $< 69 - 1.5(2)$, < 66, 65 is an outlier

> Q3 + 1.5 IQR: $> 71 + 1.5(2)$, > 74 none

Females: = 65 − 62 = 3

$< 62 - 1.5(3)$, < 57.5 no

$> 65 + 1.5(3)$, > 69.5 no

9. Describe your modified side-by-side boxplot for ***both*** the males and females.

Males

Shape: Symmetric
Outliers: 65 inches
Center: 70 inches
Spread: 65 to 73

Females

Shape: skewed to left
Outliers: none
Center: 64.5 inches
Spread: 58 to 67 inches

10. Compare the median heights of the males and females. Why do you think there is such a significant difference between the two?

the median for males was 70 inches (5'10"), and for females was 64.5 inches (5'4½"). Males tend to be taller.

11. Compare the shapes of the male and female boxplots. What differences do you notice? Give at least three reasons as to why these differences might emerge.

1) the males were symmetric with one low outlier, which means their heights were evenly distributed.

2) the females heights were skewed to the left. that means this group had more girls on the taller side.

3) the maximum height for girls was close to the minimum height for boys. In general, the girls were shorter.

12. This just in! NBA basketball player Yao Ming has relocated to East Brunswick from Shanghai. He has decided to enroll back into high school to receive his diploma. He is placed in our Statistics Honors class. He is 7 feet and 5 inches tall. What do you think would happen to the male's boxplot if you added his height to the data set?

(7x12) = 84 + 5 = 89"

* the maximum would increase to 89 inches.
* 89 inches would be an outlier (> 1.5 IQR) and would show up as a dot not attached to a whisker on the plot.

13. How does Yao Ming's height affect the median of the male's boxplot? Why?

* the median did not change (still 70 inches).
* this is because the median is a resistant measure of center. It is not affected by outliers, since it is simply the middle value.

14. Would the mean be an appropriate measure of center for this data? Explain your reasoning.

No because the outlier will have a big impact on the mean. (It will increase significantly.)

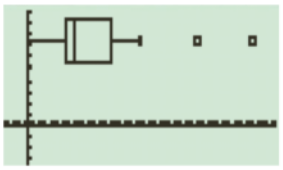
Statistics Honors Boxplots Practice (Day 4) Name _____

Using Boxplots to Analyze Data - GROUP 2

1. Create a modified boxplot using the **entire class' data on studying time**. Be sure to write down the 5-number summary and to show all work for outliers.

Studying time for Students in Mrs. Dynarski's Statistics H. Classes

minX=0
Q1=10
Med=12.5
Q3=22.5
maxX=60



Work for outliers: IQR = Q3 - Q1 = 22.5 - 10 = 12.5

< Q1 - 1.5 IQR: < 10 - 1.5(12.5) < -8.75

> Q3 + 1.5 IQR: > 22.5 + 1.5(12.5) > 41.25

45 and 60 are outliers

2. Describe your modified boxplot.

Shape: Skewed to the right

Outliers: 45 and 60 minutes

Center: Median = 12.5 minutes

Spread: 0 to 60 minutes

3. What do you notice about the median? Why do you think this is so?

12.5 minutes would be the time that a typical student reported studying.

4. Are there any outliers? If so, do they affect the shape of your boxplot? Why or why not?

there are outliers at 45 and 60 minutes. they don't change the shape, they just show up as dots that are not attached to whiskers.

5. One of the other Statistics Honors teachers, Ms. Paul, is currently at the Graduate School of Education at Rutgers University. Based on the rigor of her classes, she spends an hour and a half reading and working on papers. What do you think would happen to your boxplot if you added her studying time to the data set?

90 minutes would be an outlier on the box plot.

6. How does Ms. Paul's studying time affect the median of your boxplot? Why?

* the median increased very slightly (from 12.5 to 15 minutes) since the median is a resistant measure of center.

* outliers do not affect the median very much since the median is the middle value.

7. Create a modified *side by side* boxplot (*one for each*) using **our class' male and female studying times**. Be sure to write down the 5-number summary and to show all work for outliers.

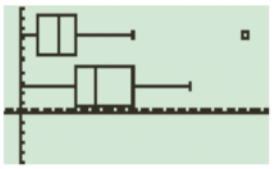
Males

n=18
minX=0
Q_1=5
Med=10
Q_3=15
maxX=60

Females

n=14
minX=0
Q_1=15
Med=20
Q_3=30
maxX=45

Studying time for Students in Mrs. Dynarski's Statistics H. Classes



Males

Females

Work for outliers:

Males: IQR = 15-5 = 10

< Q1 - 1.5 IQR: < 5 - 1.5(10), < -10 none

> Q3 + 1.5 IQR: > 15 + 1.5 (10), > 30

60 is an outlier.

Females: IQR = 30-15 = 15

< Q1 - 1.5 IQR: < 15 - 1.5(15), < -7.5 none

> Q3 + 1.5 IQR: > 30 + 1.5 (15), > 52 none

8. Describe your modified side-by-side boxplot for ***both*** the males and females

Males

Shape: Skewed to Rt
Outliers: 60 min
Center: 10 min
Spread: 0 to 60 min

Females

Shape: Skewed to Rt
Outliers: none
Center: 20 min
Spread: 0 to 45 min.

9. Compare the median studying times of the males and females. Why do you think there is such a significant difference between the two?

* the girls median (20 min.) was double that of the boys (10 min).
* the group of girls sampled reported higher study times

10. Compare the shapes of the male and female boxplots. What differences or similarities do you notice? Give at least three reasons as to why these differences/similarities might emerge.

1) Both distributions are skewed to the right, meaning both have higher concentrations at lower studying times.
2) the spreads are fairly similar, but the males is higher due to the outlier of 60 minutes.
3) the girls had a higher median (20 vs 10 min) since they reported higher study times.

11. One of the other Statistics Honors teachers, Ms. Paul, is currently at the Graduate School of Education at Rutgers University. Based on the rigor of her classes, she spends an hour and a half reading and working on papers. What do you think would happen to your female boxplot if you added her studying time to the data set?

90 minutes would be an outlier on the box plot.

12. How does Ms. Paul's studying time affect the median of the female's boxplot?

* the median did not change (still 20 min.).
* this is because the median is a resistant measure of center.
* outliers do not affect the median very much since the median is simply the middle value.