**Outliers and the** $1.5×IQR$ **Rule**

1. Ms. Sanchez gave a test to one of her algebra classes. Here are the scores:

|  |
| --- |
| 83, 86, 91, 78, 80, 33, 75, 91, 72, 82, 88, 84, 93, 99, 74, 79, 90 |

1. Look at the list of scores. Is there one score in the list that looks very different from the others? Which one? Explain.
2. One student in class was absent for the four days before the test was given. Which score most likely belonged to this student? Explain.
3. Sort the data and record the five-number summary in the chart below (You can use the

1-Var Stats command on your calculator to find these statistics).

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | minimum | Q1 | median | Q3 | maximum |
| **Algebra Test Scores** |  |  |  |  |  |

1. Find the **interquartile range** (IQR). The interquartile range equals Q3 – Q1.
2. Statisticians have observed that in most data sets, almost all data values lie between a “lower fence” and an “upper fence.” The fences are at the first quartile minus 1.5 times the IQR, and the third quartile plus 1.5 times the IQR. Calculate the fences according to the formulas given below:

 $Lower fence=Q1 – 1.5 × IQR= $\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 $Upper fence=Q3 + 1.5 × IQR=$\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Any data point that does not lie within the two fences is called an **outlier**. Which test score is an outlier?

**Switching Teams**

1. When LeBron James played for the Cleveland Cavaliers during the 2009-2010 season, was he an outlier? Here are the statistics for all players on the team that year.

|  |  |  |
| --- | --- | --- |
| **Rank** | **Player** | **Points per Game** |
| 1 | LeBron James | 29.7 |
| 2 | Antawn Jamison | 15.8 |
| 3 | Mo Williams | 15.8 |
| 4 | Shaquille ONeal | 12.0 |
| 5 | Sebastian Telfair | 9.8 |
| 6 | Delonte West | 8.8 |
| 7 | Anderson Varejao | 8.6 |
| 8 | J.J. Hickson | 8.5 |
| 9 | ZydrunasIlgauskas | 7.4 |
| 10 | Anthony Parker | 7.3 |
| 11 | Daniel Gibson | 6.3 |
| 12 | Jamario Moon | 4.9 |
| 13 | Jawad Williams | 4.1 |
| 14 | Leon Powe | 4.0 |
| 15 | Danny Green | 2.0 |
| 16 | Darnell Jackson | 0.8 |
| 17 | Cedric Jackson | 0.2 |
| 18 | Coby Kari | 0.0 |

1. Record the five-number summary of the points per game in the chart below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | minimum | Q1 | median | Q3 | maximum |
| **Points Per Game** |  |  |  |  |  |

1. Find the IQR.
2. Find the fences:

 $Lower fence=Q1 – 1.5 × IQR =$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 $Upper fence=Q3 + 1.5 × IQR= $\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Any data value outside the fences is an outlier. Are there any outliers on this team? If so, who?
2. Now apply the same analysis to the Miami Heat for the 2010-1011 season. Here are the statistics.

|  |  |  |
| --- | --- | --- |
| **Rank** | **Player** | **Points per Game** |
| 1 | LeBron James | 26.7 |
| 2 | Dwyane Wade | 25.5 |
| 3 | Chris Bosh | 18.7 |
| 4 | UdonisHaslem | 8.0 |
| 5 | Mike Bibby | 7.3 |
| 6 | Eddie House | 6.5 |
| 7 | Mario Chalmers | 6.4 |
| 8 | James Jones | 5.9 |
| 9 | Carlos Arroyo | 5.6 |
| 10 | Mike Miller | 5.6 |
| 11 | ZydrunasIlgauskas | 5.0 |
| 12 | Erick Dampier | 2.5 |
| 13 | Juwan Howard | 2.4 |
| 14 | Joel Anthony | 2.0 |
| 15 | Jamaal Magloire | 1.9 |
| 16 | Jerry Stackhouse | 1.7 |
| 17 | Dexter Pittman | 1.0 |

1. Record the five-number summary of the points per game in the chart below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | minimum | Q1 | median | Q3 | maximum |
| **Points Per Game** |  |  |  |  |  |

1. Find the IQR.
2. Find the fences:

 $Lower fence=Q1 – 1.5 × IQR =$ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 $Upper fence=Q3 + 1.5 × IQR=$\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Any data value outside the fences is an outlier. Are there any outliers on this team? If so, who?