EXAMPLE

Technology: FREE WEBSITE

How to use technology to determine measures of center, measures of variation, and measures of position

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Link to website

• Please bookmark this website on your personal device.

EXAMPLE: What is the average age, in years, of students taking classes on the GHC-Cartersville campus in Spring 2018?

<table>
<thead>
<tr>
<th>54</th>
<th>22</th>
<th>20</th>
<th>19</th>
<th>19</th>
<th>20</th>
<th>19</th>
<th>19</th>
<th>18</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td>21</td>
<td>19</td>
<td>19</td>
<td>24</td>
<td>18</td>
<td>18</td>
<td>17</td>
<td>19</td>
<td>19</td>
<td>24</td>
</tr>
<tr>
<td>19</td>
<td>18</td>
<td>19</td>
<td>18</td>
<td>18</td>
<td>21</td>
<td>32</td>
<td>19</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>19</td>
<td>21</td>
<td>23</td>
<td>18</td>
<td>19</td>
<td>19</td>
<td>18</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>34</td>
<td>44</td>
<td>23</td>
<td>21</td>
<td>26</td>
<td>28</td>
<td>31</td>
<td>49</td>
<td>24</td>
</tr>
</tbody>
</table>

(n=50, minimum 17, maximum 54)
<table>
<thead>
<tr>
<th>Ages (in years)</th>
<th>Tally</th>
<th>Frequency</th>
<th>Relative Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 - 19</td>
<td>IIII</td>
<td>26</td>
<td>(\frac{26}{50} \times 100% = 52%)</td>
</tr>
<tr>
<td>20 - 24</td>
<td>IIII</td>
<td>14</td>
<td>(\frac{14}{50} \times 100% = 28%)</td>
</tr>
<tr>
<td>25 - 29</td>
<td>III</td>
<td>4</td>
<td>(\frac{4}{50} \times 100% = 8%)</td>
</tr>
<tr>
<td>30 – 34</td>
<td>III</td>
<td>3</td>
<td>(\frac{3}{50} \times 100% = 6%)</td>
</tr>
<tr>
<td>35 – 39</td>
<td></td>
<td>0</td>
<td>(\frac{0}{50} \times 100% = 0%)</td>
</tr>
<tr>
<td>40 - 44</td>
<td>I</td>
<td>1</td>
<td>(\frac{1}{50} \times 100% = 2%)</td>
</tr>
<tr>
<td>45 - 49</td>
<td>I</td>
<td>1</td>
<td>(\frac{1}{50} \times 100% = 2%)</td>
</tr>
<tr>
<td>50 - 54</td>
<td>I</td>
<td>1</td>
<td>(\frac{1}{50} \times 100% = 2%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>Sample size, n = 50</strong></td>
<td><strong>Sample size, n = 50</strong></td>
</tr>
</tbody>
</table>
EXAMPLE: What is the average age, in years, of students taking classes on the GHC-Cartersville campus in Spring 2018?

- The distribution of student ages is skewed to the right.

- We could ESTIMATE that the average age is between 16 and 28.

- We need to calculate the descriptive statistics for the raw data using technology.
Using Free Website

- Go to website: https://www.calculatorsoup.com/calculators/statistics/descriptivestatistics.php
- Enter Data – include a space between each data value
Using Free Website

- With one “click”, the website will calculate the following descriptive statistics:
  - Minimum (data value)
  - Maximum (data value)
  - Range
  - Count (this is the sample size, n)
  - Sum (of the data values) –IGNORE
  - Mean
  - Median
  - Mode
  - Standard Deviation (of the SAMPLE, this is s)
  - Variance (of the SAMPLE)
  - Mid range (IGNORE)
  - Quartiles
  - Interquartile Range (IQR)
- IGNORE THE REST—Sum of Squares, Mean Absolute Deviation, Root Mean Square, Standard Error of Mean, Skewness, Kurtosis, Coefficient of Variation, and Relative Standard Deviation (these are more advanced topics that we do not and will not cover!!!)
Using Free Website

• After data is entered, click on the button labeled “calculate”

• Results will appear in the “answer box”
• Now, we can answer the original research question, “what is the average age, in years, of students taking classes on the GHC-Cartersville campus in Spring 2018?”
  • For the sample of 50 randomly selected students, the sample mean (average) is approximately 23 years of age. Therefore, we can infer that the average age of all students taking classes on the GHC-Cartersville campus in Spring 2018 is 23 years.

• We can also verify that the distribution by comparing the mean, median, and mode.
  • Mean = 23, Median = 19, and Mode = 19

\[ 19 \leq 19 < 23 \text{ or } mode < median < mean \] (refer back to Module 2 Lesson 2), so we can definitely say the distribution of the data is skewed to the right.
Now what?

• We can determine if the data set has any outliers.

• Use the formula & guidelines:
  • Any data value that is less than (or below) $Q_1 - 1.5IQR$ or any data value that is greater than (or above) $Q_3 + 1.5IQR$ is considered an outlier.
  
  • $Q_1 = 19$
  • $Q_3 = 24$
  • $IQR = 5$
  • So on the lower end of the data values, $Q_1 - 1.5IQR = 19 - 1.5(5) = 19 - 7.5 = 12.5$ There are no data values (ages) lower than 12.5 years.
  • So on the upper end of the data values, $Q_3 + 1.5IQR = 24 + 1.5(5) = 24 + 7.5 = 31.5$ There are data values(ages) greater than 31.5 years. Each of those data values is considered an outlier (32, 34, 44, 49, 54).