

Week 6: Data

Solutions

1. In a science experiment, six students each measured the acceleration due to gravity and their results (in ms^{-2}) were 9.9, 9.7, 9.7, 8.3, 10.1, 10.0. Calculate the mean and explain whether you think this is a good measure of average in this context. (from Foundations of Advanced Mathematics)

Solution: Mean = 9.617. Not a good measure in this case as it is distorted by the very low figure of 8.3. The median would be better here (median = 9.8).

2. For the following data calculate the mean, variance and standard deviation, the median, upper and lower quartiles, inter-quartile range and illustrate in a boxplot.

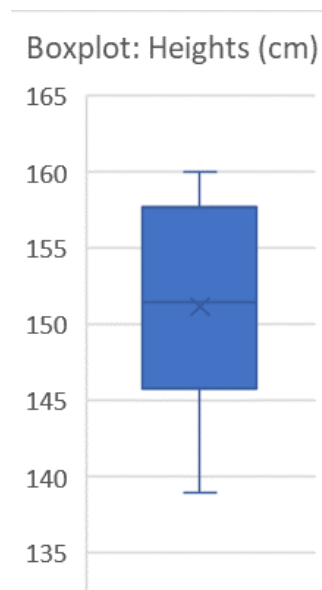
Height (cm)	149	160	155	153	142	158	145	150	157	139	158	148
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Given the distribution, suggest what group of people are these data likely to refer to?

Solution: Mean = 151.17 cm, variance = 42.47, standard deviation = 6.517 Or variance = 46.33, standard deviation = 6.807 if divide by $n - 1$, treating the data as a sample, not the whole population.

Median = 151.5, LQ = 146.5, UQ = 157.5, Inter-quartile range = 11.0

The data are actually the heights of 12 year-old (UK).



3. For the following data calculate the mean, variance and standard deviation, the median, upper and lower quartiles, interquartile range and illustrate in a histogram.

Pulse	Frequency
<50	1
50 - 59	5
60 - 69	34
70 - 79	27
80 - 89	15
90 - 99	9
100+	1
Total	92

According to the NHS, most adults have a resting heart rate of 60 to 100 beats per minute. It says: 'The fitter you are, the lower your resting heart rate is likely to be'. For example, athletes may have a resting heart rate of 40 to 60 bpm or lower. Is the data above consistent with this comment? Explain.

Solution: Mean = 73.80, variance = 132.27, sd = 11.50

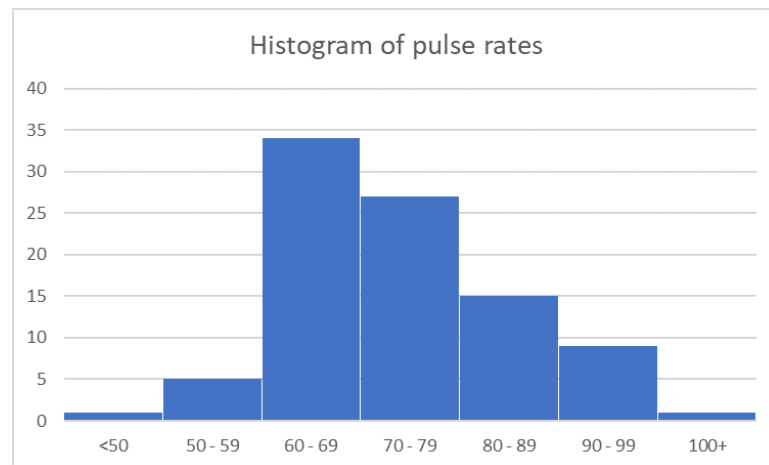
Or taking the data as a sample from a larger population, variance = 133.72, sd = 11.56.

Median of 92 people is the $46 \frac{1}{2}$ th person, i.e in the group 70 -79, interpolate to 72.4

LQ = in the group 60 - 69, interpolate to 65.1

UQ = in the group 80 - 89, interpolate to 81.8

Interquartile range = 16.7



In our data, most pulse rates were between 60 and 90 (83%), and 92% were in the standard range of 60 to 100. There were 6% people with a rate less than 60, 5% in the range 50 to 59, so perhaps a small group of the people measured might have been athletes, (though this is conjecture).