MARKS

3

(1, 1, 1)
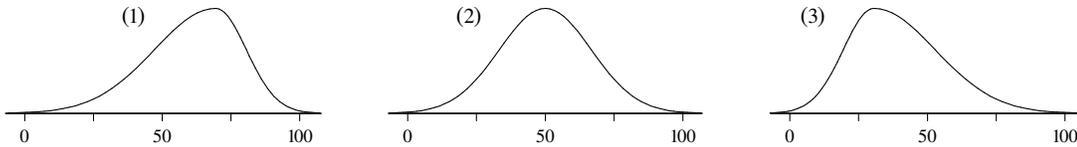
4. Below are sketches of the histograms for three data sets.

   (a) In scrambled order, the averages are: 40, 50, 60; match the histograms with the averages.

   (b) The standard deviation of histogram (3) is closest to: 5, 15, 50? Choose one option and explain briefly.

   (c) The standard deviation of histogram (1) is *a lot* smaller than that of histogram (3): **True** or **False**? Explain briefly.

   (a) (2) has average 50 by *symmetry*; (1) has average 60 and (3) has 40 because the average of (1) is *greater* than the average of (3).

   (b) S.d. of (3) is closest to 15, because the 'average' deviation from the average is clearly more than 5 but less than 50.

   (c) **False** – the two distributions are *mirror images* of each other and so have closely *similar* standard deviations.

MARKS

2

5. Both the following small data sets have the same average of 100. Which one has the *smaller* standard deviation and why? Explain on the basis of an examination of the data **without computation**.

   (1) 100, 80, 120, 60, 140, 50, 150, 100, 100, 100;

   (2) 100, 80, 120, 60, 140, 50, 150.

   Standard deviation is $\sqrt{\text{'average' squared deviation from the average}}$.

1

Data set

   Data set (1) has the smaller s.d. – the first 7 observations are *identical* and its three additional observations are all *at the average* (100); they therefore contribute *no further* deviation, but the *larger* number of observations (10 rather than 7) makes the 'average' deviation *smaller.*

MARKS

2

6. The average and median salaries of major league baseball players in 1993 were $490,000 and $1,160,000. Which of these two values is the average and which is the median? Explain your reasoning briefly.

   The distribution of players' salaries has a lower limit of 0 (in principle) and a long *right* tail, corresponding to the small proportion of highly-paid exceptional players.

   Because the distribution is skewed to the *right*, the average is *greater than* the median.

   Hence, of the two numbers given, $1,160,000 is the average and $490,000 is the median.

$ 1,160,000

Average

$ 490,000

Median