BPP
ACTUARIAL
EDUCATION

Module 0

Pure Mathematics and Statistics for Actuarial Studies

The errors and syllabus clarification here apply to different versions of the textbook. See the listing before each section. The version you have can be found on the reverse of the first page of your textbook at the top.

Errata

Chapter 3

- **First edition March 2014 V3**
- **Second Edition November 2018**

There is an error on page 37. The first bullet point should read:

If the power function is of the form $f(x) = c^x$ (where x is the power) consider if c is greater than 1 or not

So please delete the comment about 'positive or negative'.

Chapter 10

- **First edition March 2014 V3**

There is an error on page 217. At the top of the page there are two tables showing observations from a discrete distribution. The last group reads 16-10, but it should read 16-20 in both tables. (Exactly the same error appears on pages 234 and 235 in Chapter 11, as detailed later in this document.)

There is also an error on page 221. The text and table shown below:

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The relative positions of the mode, median and mean for different types of data sets are summarised below.

Relative positions of mode, median and mean

The relative positions of the mode, median and mean tell us about the shape of a data set.

mode = median = mean	for a symmetrical data set
mode < median < mean	for a positively skewed data set
mode > median > mean	for a negatively skewed data set

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should be replaced by the wording on the following page.

These two examples are what we might describe as 'well-behaved' data sets. By this we mean data sets for which the relative positions of the mode, median and mean for distributions of different shapes are as shown below.

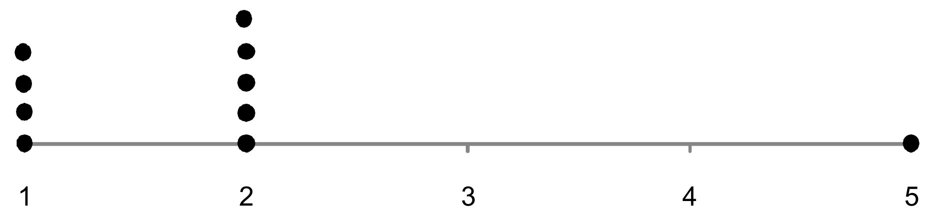
Relative positions of mode, median and mean for *well-behaved* data sets

mode = median = mean	for a symmetrical data set
mode < median < mean	for a positively skewed data set
mode > median > mean	for a negatively skewed data set

So, while most data sets will follow one of these patterns, not all of them do. Let's take the previous data set and simply change the '3's into '1's, and the '4' into a '2'. The ordered set now looks like:

1 1 1 1 2 2 2 2 2 5

A dotplot of these data values is shown below:



The data set is still positively skewed, as it still tails off to the right. The sample mode is still 2, the sample mean is now:

$$\frac{1+1+1+1+2+2+2+2+2+5}{10} = \frac{19}{10} = 1.9$$

and the sample median is now 2 (as the 5th and 6th values are both 2). So, for this positively skewed data set, both the mode and median are greater than the mean, contrary to the 'standard' pattern we gave above.

So the relative positions of the mode, median and mean (for skewed data sets) cannot be used to identify the direction of skewness with certainty. To be certain of whether the skewness is positive or negative, we have to calculate its numerical value. This is covered in the next chapter.

Chapter 11

- **First edition March 2014 V3**

There is an error on pages 234 and 235. There are two tables showing observations from a discrete distribution. The last group reads 16-10, but it should read 16-20 in both tables.

- **Second edition November 2018**

There is an error on page 227. In the section titled ‘Estimating the range from a grouped frequency distribution’, the claim amounts in the table should start from £100 rather than 0.

There is an error on page 239. At the start of the section titled ‘Calculating the variance and standard deviation from a frequency distribution’, the first line has an error message, ‘Error! Reference source not found’. This should say ‘Example 11.7’.

Chapter 14

There is an error on page 299. The formula for the binomial coefficient should be:

$$^nC_r = \frac{n!}{(n-r)!r!}$$

Syllabus clarification

- **First edition March 2014 V3**

Chapter 6

We have received clarification from CAA Global that two topics contained within this textbook will not be tested in the Module 0 exam. These topics are:

Non-stationary points of inflexion (pages 116-117), meaning that Example 6.16 and Practice Question 6.17(ii) are not examinable.

Taylor’s series for functions of two variables (pages 129-130), meaning that Example 6.27 and Practice Questions 6.28 and 6.29 are not examinable.

Chapter 11

We have received clarification from CAA Global that the method that should be used to calculate the variance and standard deviation is **not** the one shown in the textbook, tests and online material.

The method that the examiners use is where the set of values is considered to be the population itself and not a sample from a larger population. The denominator should therefore be n and not $n-1$.

This means that the formulae for the variance and standard deviation should be:

$$s^2 = \frac{1}{n}\sum_{i=1}^{n}(x_i - \overline{x})^2 = \frac{1}{n}\left(\sum_{i=1}^{n} x_i^2 - n\overline{x}^2\right) \qquad s = \sqrt{\frac{1}{n}\sum_{i=1}^{n}(x_i - \overline{x})^2} = \sqrt{\frac{1}{n}\left(\sum_{i=1}^{n} x_i^2 - n\overline{x}^2\right)}$$

$$s^2 = \frac{1}{n}\sum_{i=1}^{m}(x_i - \overline{x})^2 f_i = \frac{1}{n}\left(\sum_{i=1}^{m} x_i^2 f_i - n\overline{x}^2\right) \text{ where } n = \sum_{i=1}^{m} f_i \text{ and } \overline{x} = \frac{\sum_{i=1}^{m} x_i f_i}{\sum_{i=1}^{m} f_i} = \frac{\sum_{i=1}^{m} x_i f_i}{n}.$$

The online material has been updated to reflect these changes.