

### Exercise 3

A printout showing the problem, solution method, codes developed, and outputs produced for the tests indicated is due during and before the end of the class on Thursday, 19 July 2018. The deadline is strictly observed.

1. Implement a Java class PieChart that displays a pie chart of the probabilities of the  $n$  most frequent occurrences of an event to be specified in part 3 of the exercise. The probability of event is given by the equation:

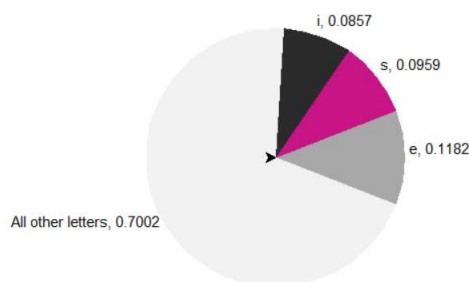
$$\text{Probability of event} = \frac{\text{Frequency of event}}{\sum \text{Frequencies of all events}}$$

In the pie chart:

- i. The area of each segment is proportional to the probability of the corresponding event:

$$\text{Probability of event} = \frac{\text{Central angle of segment}}{2\pi}$$

- ii. Each segment has a different color;
- iii. Each segment has a legend showing the event and its probability;
- iv. The last segment represents “All Other Events” and their cumulative probability. For example, in the graph below where the event is the occurrence of a letter in a text:  $n = 3$ , and the probability of All Other Events is *one* minus the sum of the probabilities of events  $e$ ,  $s$ , and  $i$ ;



2. The PieChart class includes appropriate constructors and a method *draw* that draws the pie chart. The drawing panel should include appropriate GUI components to input the number of events,  $n$ , and display the pie chart together with the events probabilities. You may amend and use the class hierarchy in

previous exercises, but in any case you may only use your own classes and methods for the operations included.

3. Implement a Java class HistogramLetters that calculates the  $n$  most frequent letters in the file “*Emma.txt*” and their probabilities. The HistogramLetters class utilizes the drawing panel above to draw a pie chart of the letter probabilities.

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