**Self-assessment: 24 Continuous distributions**

**1.** The amount of coffee dispensed by a machine follows normal distribution with mean 150 ml and standard deviation 5 ml.

(a) Calculate the probability that the machine dispenses less than 142 ml of coffee.

(b) Find the value of *a* if 20% of cups contain more than *a* ml of coffee.

*(accessible to students on the path to grade 3 or 4) [5 marks]*

**2.** A continuous random variable has probability density function given by:

*f* (*x*) = 

(a) Find the value of *k*.

(b) Calculate P(*X* < 0.3).

*(accessible to students on the path to grade 3 or 4) [5 marks]*

**3.** It is known that the heights of a certain plant follow a normal distribution. In a sample of 200 plants, 32 are less than 45 cm tall and 50 are more than 88 cm tall. Estimate the mean and the standard deviation of the heights.

*(accessible to students on the path to grade 5 or 6) [6 marks]*

**4.** Random variable *X* has the probability density function given by:

*f* (*x*) = 

1. Calculate the expected value and the variance of *X*.

*(accessible to students on the path to grade 3 or 4)*

1. Find the mode of *X*.

*(accessible to students on the path to grade 5 or 6)*

(c) (i) Show that the median of *X* satisfies 2*m*4 – 12*m*2 + 5 = 0.

(ii) Hence find the median of *X*.

*(accessible to students on the path to grade 7)*

*[14 marks]*