**Self-assessment: 23 Discrete probability distributions**

**1.** The random variable *X* has distribution shown in the table below:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| ***x*** | 1 | 3 | 4 | 6 | 7 |
| **P(*X* = *x*)** | *p* |  |  | 2*p* |  |

(a) Find the value of *p*.

(b) Find P(*X* ≥ 4).

(c) Find the expected value of *X*.

*(accessible to students on the path to grade 3 or 4) [8 marks]*

**2.** Random variable *X* follows binomial distribution B(6, *p*) and P(*X* = 4) = 0.261.

(a) Find the possible values of *p*.

(b) For the maximum value from (a), find P(*X* ≤ 2).

(c) For the maximum value from (a), find E(*X*) and Var(*X*).

*(accessible to students on the path to grade 5 or 6)* *[8 marks]*

**3.** Natasha receives postcards at a constant mean rate of 5 per week. The postcards arrive independently of each other.

(a) Find the probability that she receives 3 postcards in a particular week.

(b) Find the standard deviation of the number of postcards received per week.

(c) Find the probability that she receives fewer than 15 postcards in a four-week period.

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

(d) (i) What is the probability that she receives more than 5 postcards in both of two consecutive weeks?

(ii) Find the probability that she receives more than 5 postcards in four out of eight consecutive weeks.

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

*[14 marks]*