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

**1.** (a) ∑ P(*X* = *x*) = 1

⇒ 3*p* +  = 1

⇒ *p* = 

(b) P(*X* ≥ 4) = 

(c) E(*X*) = ∑ *x*P(*X* = *x*) = *[8 marks]*

**2.** (a) *p*4(1 – *p*)2 = 0.261

⇒ *p* = 0.529 or 0.787 (GDC)

(b) P(*X* ≤ 2|*p* = 0.787) = 0.0213

(c) E(*X*) = *np* = 4.72, Var(*X*) = *np*(1 – *p*) = 1.01*[8 marks]*

**3.** Let *N* be the number of postcards in a single week. *N* ~ Po(5)

(a) P(*N* = 3) = 0.140 (3SF)

(b) Var(*N*) = 5 so standard deviation =  = 2.24 (3SF)

(c) Let *F* be the number of postcards in four weeks. *F* ~ Po(20)

⇒ P(*F* < 15) = 0.105

(d) (i) P(*N* > 5) = 1 – P(*N* ≤ 5) = 0.384

Probability of more than 5 in two weeks is 0.3842 = 0.147

(ii) Let *X* be the number of weeks in which more than 5 cards are received.

*X* ~ B(8, 0.384)

P(*X* = 4) = 0.219*[14 marks]*