Section 1: Introducing the binomial distribution

Exercise level 1

1. $X \sim B(8, 0.6)$. Find the following probabilities:
   (i) $P(X = 0)$
   (ii) $P(X = 3)$
   (iii) $P(X = 6)$

2. $X \sim B(10, 0.7)$. Find the following probabilities:
   (i) $P(X = 0)$
   (ii) $P(X = 1)$
   (iii) $P(X > 1)$
   (iv) $P(X < 3)$

3. $X \sim B(12, 0.4)$.
   What is the most likely outcome for X?

4. $X \sim B(8, 0.4)$.
   What is the most likely outcome for X?

5. A school estimates the probability that a student passes an exam to be 0.9. Only 5 students are taking the exam.
   (i) What is the probability that all 5 students pass?
   (ii) What is the probability that only 2 students pass?
   (iii) What is the probability that at least 3 students pass?
   (iv) What is the most likely number of students who pass?

6. Using recent data provided by the low-cost airline Brianair, the probability that a passenger loses his suitcase on a flight is estimated to be 0.05. On six different occasions I am taking a flight with Brianair.
   (i) What is the probability that I arrive with my suitcase on all flights?
   (ii) What is the probability that I lose my suitcase on at least 1 occasion?
   (iii) What is the probability that I lose my suitcase exactly once?

7. An online store claims that 75% of orders are dispatched on the next working day. I use this online store regularly, and only 4 of my last 10 orders were dispatched on the next working day.
   (i) What is the probability using the store's figures that exactly 4 out of 10 orders are dispatched on the next working day?
   (ii) What is the probability using the store's figures that fewer than 4 out of 10 orders are dispatched on the next working day?