

CS2013

Mathematic for Computing Science

Tutorial 7

1.

A bag contains five blue balls, seven red balls and eight green balls. What is the probability of drawing two balls of the same colour on two successive draws?

- (i) with replacement;
- (ii) without replacement.

2.

Suppose you have a fair dice with four sides (maybe a pyramid). You throw it four times.

- (i) What is the probability of throwing a 4 first, then three other numbers?
- (ii) Use the *binomial formula* to compute the probability of throwing exactly **one** 4 in four throws. (*Hint: Multiply the probability found above with the factor prescribed by the binomial formula. Can you see why this is the right factor?*)
- (iii) Same question for the probability of throwing exactly **two** 4's in four throws.
- (iv) Same question for the probability of throwing exactly **four** 4's in four throws.

3.

What is the probability of throwing a one exactly three times in ten throws of a fair six-sided dice?

4.

A supermarket stocks eggs in boxes of 6, and 10% of the eggs are found to be cracked. Assuming that the cracked eggs are distributed at random and that the customer selects a box at random, what is the probability that the box that the customer selects will have no cracked eggs?

5. *[Discussion question]*

Discuss the probability of an arbitrary future football match in the Premiership ending in a draw. (The match that will decide the bet will be drawn at random.) Consider the implications of an a priori perspective (assuming that all match scores are equally likely) and an experimental perspective.

6. *[Discussion question]*

Suppose you're on a game show, and you're given a choice of three doors: Behind one door is a car; behind the other two, goats. You pick a door, say number 1, and the host, who knows what's behind the doors, opens another door, say number 3, which has a goat. He says to you, "Do you want to pick door number 2?" -- Is it to your advantage to switch your choice of doors? (The "Monty Hall" problem due to Marilyn vos Savant, published in Parade Magazine)