

1. The time in minutes that Elaine takes to checkout at her local supermarket follows a continuous uniform distribution defined over the interval $[3, 9]$.

Find

(a) Elaine's expected checkout time, **(1)**

(b) the variance of the time taken to checkout at the supermarket, **(2)**

(c) the probability that Elaine will take more than 7 minutes to checkout. **(2)**

Given that Elaine has already spent 4 minutes at the checkout,

(d) find the probability that she will take a total of less than 6 minutes to checkout. **(3)**

4. In a game, players select sticks at random from a box containing a large number of sticks of different lengths. The length, in cm, of a randomly chosen stick has a continuous uniform distribution over the interval $[7, 10]$.

A stick is selected at random from the box.

- (a) Find the probability that the stick is shorter than 9.5 cm.

(2)

To win a bag of sweets, a player must select 3 sticks and wins if the length of the longest stick is more than 9.5 cm.

- (b) Find the probability of winning a bag of sweets.

(2)

To win a soft toy, a player must select 6 sticks and wins the toy if more than four of the sticks are shorter than 7.6 cm.

- (c) Find the probability of winning a soft toy.

(4)

2. The continuous random variable X is uniformly distributed over the interval $[-2, 7]$.

(a) Write down fully the probability density function $f(x)$ of X . **(2)**

(b) Sketch the probability density function $f(x)$ of X . **(2)**

Find

(c) $E(X^2)$, **(3)**

(d) $P(-0.2 < X < 0.6)$. **(2)**
