Coventry University
*School of Computing, Electronics and Mathematics*

**5005CEM** **Probability Problem Sheet 2a** **Week 6**

**1** A box contains 3 red marbles and 5 green marbles. Two marbles are taken at random *without* replacement, and the random variable $X$ is the number of green marbles obtained.

(a) Write down the sample space, i.e., the set of possible *outcomes*.

(b) Write down the set of possible *values* of the random variable $X$ and draw up a table showing the *probability distribution* of $X$, i.e., $P(X = x_i)$ for each value $x_i$.

(c) Find $E(X)$, $E(X^2)$ and $\text{var}(X)$.

epr028

**2** Two fair six-sided dice, one red and the other green, are thrown and the random variable $X$ is the score on the red dice minus the score on the green dice.

(a) Draw up a table giving the value of $X$ for each outcome in the sample space.

(b) Draw up a table showing the *probability distribution* of $X$.

(c) Find $E(X)$ and $\text{var}(X)$.

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**3** Consider the function

$$f(x) = \begin{cases} \frac{1}{2}x & 0 \le x \le 2 \\ 0 & \text{otherwise} \end{cases}$$

(a) Sketch a graph of $f(x)$.

(b) Find the area under $f(x)$.

(c) Briefly explain why $f(x)$ is a probability density function (pdf).

(d) Let $X$ be the continuous random variable with pdf $f(x)$. Determine $P(X \ge 1)$.

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