

S1 Test I

1. If $X \sim B(25, 0.4)$ calculate:

(a) $\mathbb{P}(X = 12)$,

0.1140

(b) $\mathbb{P}(X > 14)$.

0.0344

2. If $Y \sim \text{Geo}(\frac{1}{4})$ calculate:

(a) $\mathbb{P}(Y = 4)$,

0.1055

(b) $\mathbb{P}(Y \leq 8)$.

0.8999

3. X is a discrete random variable:

x	1	2	3	4
$\mathbb{P}(X = x)$	$2k$	k	$3k$	$4k$

(a) Find the value of k .

$\frac{1}{10}$

(b) Find $\mathbb{E}(X)$.

$\frac{29}{10}$

(c) Find $\text{Var}(X)$.

$\frac{129}{100}$

4. On my way to work I pass nine traffic lights. The probability any one is green when I arrive is 0.7. The signal at one light is independent of the others. Calculate the probability:

(a) all the lights are green.

0.0404

(b) exactly five are green.

0.1715

(c) at least six are green.

0.7297

5. Two variables are measured as shown in the table.

x	y
2	19
4	16
6	15
8	13
10	10

(a) Calculate the correlation coefficient r .

-0.9878

(b) Comment on your result.

Strong negative correlation

6. A normal six sided die is thrown until it shows a one, two or a three. Calculate the probability of:

(a) Success on the second throw.

$\frac{1}{4}$

(b) At least 5 throws being needed.

$\frac{1}{16}$

(c) Fewer than seven throws required.

$\frac{1}{64}$

7. Two dice are rolled and the **square of the difference** (always zero or a positive number) of the two scores is recorded.

(a) Tabulate the possible scores with their probabilities.

(b) Calculate the expectation of D .

$\frac{35}{6}$

(c) Calculate the variance of D .

$\frac{1673}{36}$