

S1 Basic Test I

1. When Mike Tyson hits a man there is a 0.4 chance of death occurring. We are interested in the number of hits required to kill someone. Calculate the probability of:

(a) death on the fourth hit.

$$\frac{54}{625}$$

(b) at least four hits required.

$$\frac{27}{125}$$

(c) fewer than seven hits required.

$$\frac{729}{15625}$$

2. On my way to work I pass nine traffic lights. The probability any one is green when I arrive is 0.6. The signal at one light is independent of the others. Calculate the probability:

(a) all the lights are green.

$$\frac{19683}{1953125}$$

(b) exactly four are green.

$$\frac{326592}{1953125}$$

(c) at least six are green.

$$0.4826$$

3. Given the frequency distribution:

x	f
$0 \leq x < 10$	3
$10 \leq x < 20$	4
$20 \leq x < 25$	7
$25 \leq x < 35$	2
$35 \leq x < 55$	1

(a) Estimate the mean.

$$19.85$$

(b) Estimate the standard deviation.

$$9.83$$

4. A bag contains 7 red and 3 black balls. Two balls are removed from the bag simultaneously.

(a) Draw a tree diagram of the situation.

(b) Find the probability they are both the same colour.

$$\frac{8}{15}$$

(c) Given that they are the same colour, find the probability they are both red.

$$\frac{7}{8}$$

5. Consider the probability distribution

x	1	2	3	4
$\mathbb{P}(X = x)$	$\frac{1}{2}$	$\frac{1}{4}$	$\frac{1}{10}$	a

(a) Find a .

$$a = \frac{3}{20}$$

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

$$\frac{19}{10}$$

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

$$\frac{119}{100}$$

6. I take 5 cards from a standard deck of cards at once. Find the probability my hand has *exactly* three hearts.

$$0.0815$$

7. Given the data

x	y
4	12
5	10
7	5
10	4

(a) Calculate r .

$$r = -0.9297$$

(b) Use a suitable regression line to predict x when $y = 8$.

$$\frac{1135}{179}$$