

S1 Basic Practice Sheet 1

1. Consider the data

v	θ
10	5
11	4
13	1

- (a) Calculate r and comment.
- (b) Calculate equation of θ on v .
- (c) Calculate equation of v on θ .

$$r = -0.99587 \dots$$

$$\theta = 18.714 \dots - 1.35714 \dots v$$

$$v = 13.7692 \dots - 0.731 \dots \theta$$

2. Consider the data

e	g
5	1
7	2
9	4

- (a) Calculate r and comment.
- (b) By calculating a suitable regression line, predict g when $e = 6$.
- (c) By calculating a suitable regression line, predict e when $g = 3$.
- (d) Why must you exercise caution if you were to predict e when $g = 8$?

$$0.9820$$

$$\frac{19}{12}$$

$$\frac{55}{7}$$

extrapolation bad

3. For the set of data 5, 7, 11, 12, 13, calculate the mean and the standard deviation. $\bar{x} = 9.6, sd = 3.072 \dots$

4. For the data:

x	f
5	2
6	7
7	10
8	12
9	5

- (a) Calculate the mean.
- (b) Calculate the standard deviation.
- (c) What is the mode?
- (d) What is the median?

$$\frac{263}{36}$$

$$1.1010$$

$$8$$

$$7$$

5. For the data

h	f
$0 \leq h < 20$	7
$20 \leq h < 40$	9
$40 \leq h < 50$	12
$50 \leq h < 60$	7
$60 \leq h < 80$	3
$80 \leq h$	1

(a) Estimate the mean.

$\frac{525}{13}$

(b) Draw a cumulative frequency curve for the data.

(c) Use it to estimate the median.

(d) Use it to find the IQR.

6. Consider the discrete random variable X .

x	0	1	2	4
$\mathbb{P}(X = x)$	$\frac{1}{2}$	$\frac{1}{8}$	$\frac{1}{8}$	$\frac{1}{4}$

(a) Calculate $\mathbb{E}(X)$.

$\frac{11}{8}$

(b) Calculate $\text{Var}(X)$.

$\frac{175}{64}$

7. Let M be the highest of the two scores when two dice are rolled. For example if you roll a 2 and a 5, you score 5. [You may find it helpful to complete a two way table.]

(a) Complete the table:

m	1	2	3	4	5	6
$\mathbb{P}(M = m)$						

(b) Calculate $\mathbb{E}(M)$.

$\frac{161}{36}$

(c) Calculate $\text{Var}(M)$.

$\frac{2555}{1296}$

8. Twenty-two women were surveyed. Their hair colour and eye colour are recorded below.

	Blue	Green	TOTAL
Blonde	2	4	6
Brunette	10	2	12
Redhead	3	1	4
TOTAL	15	7	22

A person is selected from the group. Find:

(a) $\mathbb{P}(\text{Redhead} \mid \text{Green eyes})$

$\frac{1}{7}$

(b) $\mathbb{P}(\text{Blue eyes} \mid \text{Not blonde})$

$\frac{13}{16}$

(c) $\mathbb{P}(\text{Brunette} \mid \text{Not green eyes})$

$\frac{2}{5}$

9. One bag contains 5 red and 3 yellow counters. Another bag contains 8 red and 8 yellow counters. One counter is removed from each bag.

(a) Find the probability that both counters are yellow.

$\frac{3}{16}$

(b) Find the probability that the counters are the same colour.

$\frac{1}{2}$

(c) Find the probability they are different colours.

$\frac{1}{2}$

(d) Given that the counters are the same colour, what is the probability they are both yellow?

$\frac{3}{8}$

10. In a fertility clinic, a woman who receives treatment has a 20% chance of conceiving. A sample of 14 women is taken from the clinic after they have received treatment.

(a) What assumptions must be made in order to use the binomial distribution?

- (b) What is the expected number of pregnancies in the group? $\frac{14}{5}$
- (c) What is the probability that none of them are pregnant? 0.04398
- (d) What is the probability that 3 are pregnant? 0.2501
- (e) What is the probability that more than 5 are pregnant? 0.0439
11. A young man (who is a bounder and a cad) ‘hits on’ girls at a party until he gets a number. Once he gets a number he goes home. The probability he is successful at getting a number is 0.05. Let T be the number of girls he talks to before going home.
- (a) What assumptions must be made to use the geometric distribution?
- (b) $\mathbb{P}(T = 1)$. $\frac{1}{20}$
- (c) $\mathbb{P}(T = 6)$. 0.1290
- (d) $\mathbb{P}(T \geq 4)$. 0.8574
- (e) $\mathbb{P}(T \leq 7)$. 0.3017