

S1 Basic Test II

1. Consider the probability distribution

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

- (a) By considering the probabilities, find an equation involving a and b . $\frac{5}{12} = a + b$
- (b) Given that $\mathbb{E}(X) = 2\frac{3}{4}$, find another equation involving a and b . $\frac{3}{4} = a + 2b$
- (c) Hence find a and b . $a = \frac{1}{12}, b = \frac{1}{3}$
- (d) Calculate $\text{Var}(X)$. $\frac{41}{48}$
2. A normal six sided die is thrown until it shows a two or a three. Calculate the probability of:
- (a) Success on the second throw. $\frac{2}{9}$
- (b) At least 5 throws being needed. $\frac{16}{81}$
- (c) Fewer than seven throws required. $\frac{665}{729}$
3. I wish to pick a committee of 5 people from 7 men and 8 women.
- (a) In how many ways can this selection be made with no restrictions? 3003
- (b) In how many ways can I make this selection if I require exactly 3 men? 980
- (c) In how many ways can I make this selection if I require more men than women? 1281
- (d) A committee of 5 is selected at random. What is the probability of exactly 3 men? $\frac{140}{429}$
4. The number of people traveling in vehicles along a motorway was surveyed. The results for the survey are below.

Number of people in car	Number of cars
1	14
2	20
3	5
4	7
5	2
6	1

- (a) Find the mean number of people per car. $\frac{113}{49}$
- (b) Find the standard deviation of the number of people per car. 1.2487
5. For the data

w	t
3	4
5	6
8	10
9	12

- (a) Calculate r . $r = 0.9945$
- (b) Use a suitable regression line to predict t when $w = 11$. $\frac{1298}{91}$
- (c) Comment on this prediction. Poor 'cos extrapolating