Exercise 6A:

1.

a. {1,2,3,4,5,6}

b. $\frac{9}{36}=\frac{1}{4}$

2. (a) Two events A and B are independent if and only if P(A) x P(B) = P(A and B). For example, the events 'rolling a 4 on a fair six-sided dice' and 'rolling a 6 on a fair six-sided dice' are independent.

(b) Two events a mutually exclusive if the probability of both the events occurring is 0, e.g. rolling both a 6 and a 4 on the throw of a dice.

$P(A)\times P(B)=0.26\times 0.57=0.1482$

3. $P(A\cap B)=1-\{P(A\cap B)\}'=1-0.85=0.15$

$\Rightarrow P(A)\times P(B)=P(A\cap B)$ (when considered to 2dp)

Exercise 6B:

1.

a. $\frac{15}{136}$

b. $\frac{91}{136}$

c. $\frac{101}{289}$

2.

a. 84

b. $a = 0.3$

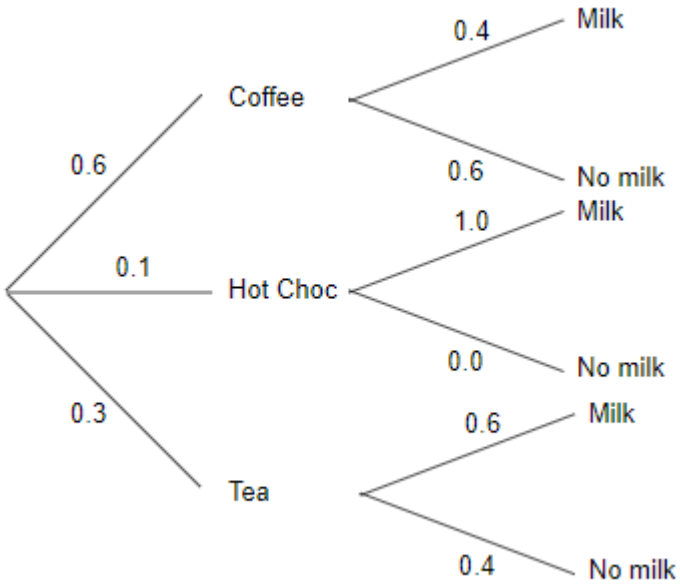
c.

$P(\text{petrol car})=(0.7\times 0.6)+0.3b=0.72$

$\Rightarrow b=1$

i.e. the probability of the dealer selling an automatic and diesel car is 0.

3.

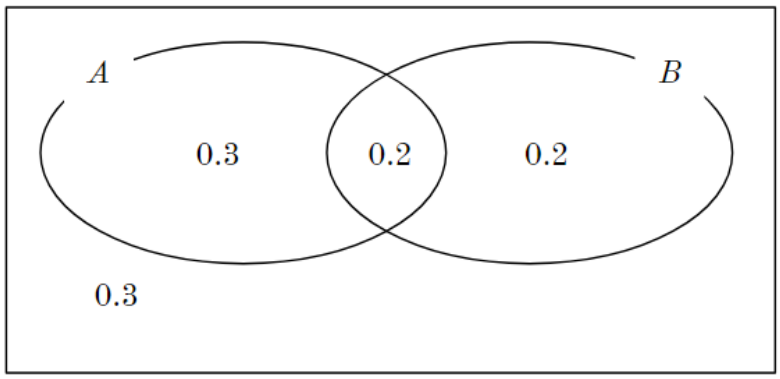


a.

b. 0.48

Exercise 6C:

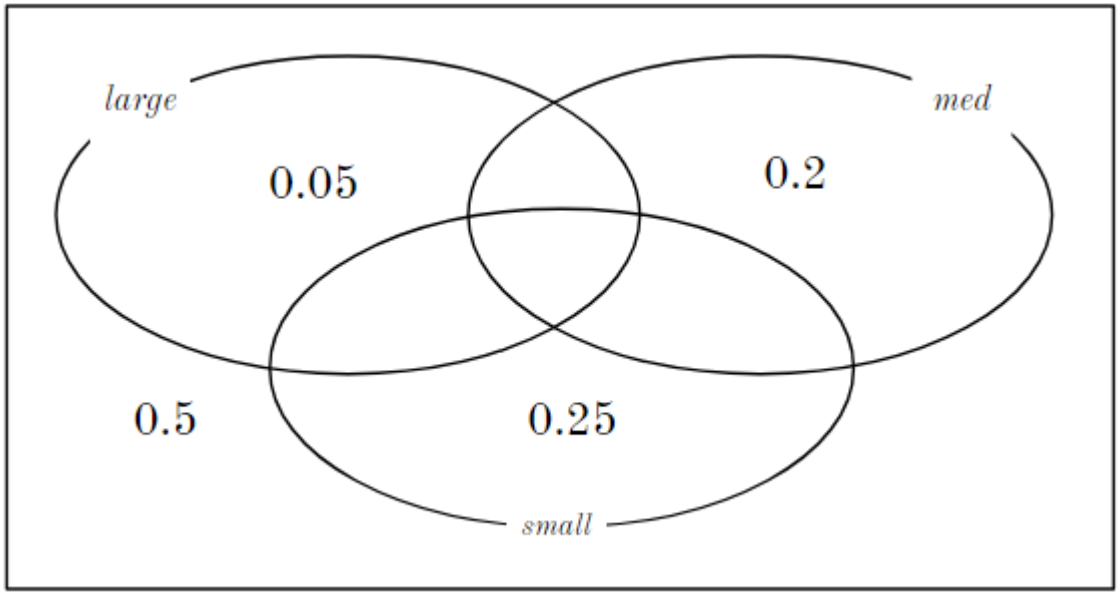
1.

a. 

b. 0.2

c. 0.5

2.



Assuming that no participant wins more than one prize.

3.

a. $b = 0.08$

b. B cannot happen unless A also happens

c. B and C are mutually exclusive

4.

a. Charlie's boss can only witness him being late if he *is* actually late

b. $a = 0.2$

c. $P(T \cap L) \neq P(T) \times P(L)$ so **not** independent

5. 0.27

Exercise 6**D**:

1.
   a. Random, continuous
   b. Random, discrete
   c. Not random
   d. Random, continuous
   e. Random, continuous

2.
   a. $k = 0.23$
   b. Negative
   c. 0

3. [Clearly, this question makes no physical sense, since the probabilities are negative and the probability function is not always positive]. Ignore the question.

4.
   a. X, the number of pieces of fruit Joshua eats, is discrete
   b.

x	1	2	3	4	5
P(X=x)	k	2k	3k	4k	5k

   c. $\frac{1}{15}$
   d. $\frac{13}{45}$

Exercise 6**E**:

1.
   a. 0.0308
   b. 3.61×10^{-8}
   c. 0.0279
   d. 5.43×10^{-7}

2.
   a. Probabilities remain constant, each choice is independent, a fixed number of trials
   b. 0.0231
   c. 0.1

d. 0.9

e. Probabilities are no longer constant

Exercise 6F:

1.

a. 2.11×10^{-10}

b. 3.82×10^{-6}

c. 4.33×10^{-8}

d. 0.0731

2.

a. 0.109

b. 1.23×10^{-11}

c. 0.994

d. 0.216

3.

a. Fixed number of trials, constant probability, independence

b. 0.8

c. 0.831

d. 1

4.

a. 5.01×10^{-15}

b. 1

c. 1

d. 0

5.

a. 3.95×10^{-7}

b. 0.0007

c. 0.139

d. 0.843

Exercise 6G:

1.
   a. 0.438
   b. 0.225
   c. 0.213
   d. 0.562
2.
   a. 0
   b. 0.998
   c. 0.186
   d. 0.982
3.
   a. 0.968
   b. 0.893
   c. 0.0001
   d. 0.0881
4. 14
5. 8
6. 28

Exercise 6H:

1.
   b. The testing process is destructive.
2.
   a. 0.383
   b. Unlikely to still be a valid model
3.
   a. 0.278
   b. 0.952
   c. 0.324
   d. No longer independent from call to call, so binomial model no longer appropriate
4.

a. 0.0313

b. 0.237

c. 0.179

d. 3

5. 0.912, assuming each visitor borrows exactly one book.

6.

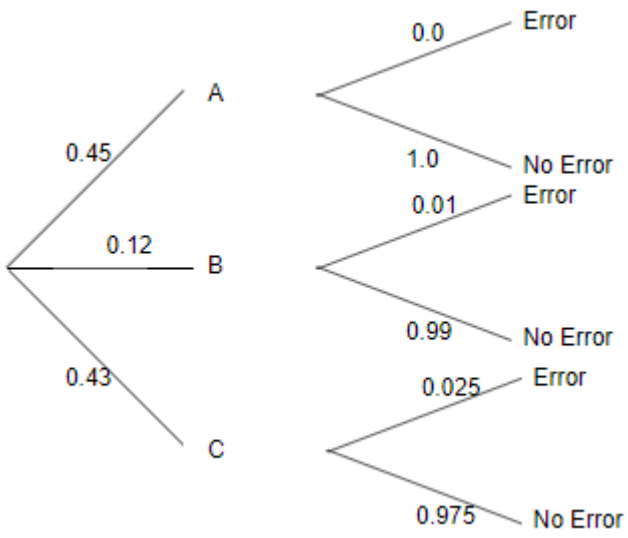
a. 0.205

b. 0.0026

c. 0.01

Mixed Exercise

1.



a.

b.

i. 0.0012

ii. 0.012

2.

a. 0

b. ab

c.

y	-4	5	8
P(Y=y)	$\frac{2}{10}$	$\frac{2}{10}$	$\frac{6}{10}$

d. $\frac{4}{10}$

3.

a. $\frac{7}{30}$

b. $\frac{9}{24}$

c. Not independent: $P(E)\times P(W)\neq P(E\cap W)$

4. $k=\frac{49}{25}$

5.

a. 0.36

b. 0.993

c. 0.262

d. Probabilities remain constant because the tiles are replaced

6.

a. Discrete uniform distribution, $k=\frac{3}{5}$

b. $\frac{4}{5}$

7. 0.2405