More about Probability

續概率

Exercises(練習)

1. A bag contains 6 blue balls and 9 yellow balls. One ball is drawn at random from the bag. Find the probability that

(a) the ball drawn is blue,

(b) the ball drawn is yellow.

一個袋裏有 6 個藍球和 9 個黃球。現從該袋中隨意抽出一個球，求下列事件的概率。

(a) 抽出的球是藍球。

(b) 抽出的球是黃球。

2. A die is thrown. Find the probability of getting

(a) a number less than 4,

(b) a number less than 1,

(c) a number greater than 0.

當投擲一枚骰子一次時，求擲得下列結果的概率。

(a) 大於 4 的點數

(b) 小於 1 的點數

(c) 大於 0 的點數

3. There are 20 boxes of electronic devices. The number of defective devices in each box is counted and the results are shown in the following table:

No. of defective devices	0	1	2	3
No. of boxes	8	5	4	3

If a box is selected randomly, find the probability that it contains

(a) no defective devices,

(b) more than one defective devices.

下表所示為 20 盒電子零件中，每盒含損壞零件的情況：

損壞零件的數目	0	1	2	3
盒數	8	5	4	3

若隨意選擇其中一個盒子，求當中

(a) 不含任何損壞零件的概率；

(b) 含多於一個損壞零件的概率。

4. Box *A* contains 1 black ball, 2 red balls and 1 green ball. Box *B* contains 1 black ball and 2 red balls. One ball is drawn at random from each of the box. Find the probability that

(a) the two balls are of the same colour,

(b) one ball is black and the other one is red.

5. When tossing 3 fair coins, determine the probability of getting

(a) 3 tails,

(b) at least 1 head.

當投擲三枚勻稱的硬幣時，求下列事件的概率。

(a) 三枚硬幣的反面向上。

(b) 至少一枚硬幣的正面向上。

6. In a city, a survey shows that the probability of a person dies before 40 is $\frac{2}{7}$. What is the probability of a person dies at or after 40?

一項調查結果顯示，某城市裏的市民的壽命短於 40 歲的概率為 $\frac{2}{7}$；那麼，壽命達 40 歲或以上的概率是多少?

7. In a forum, a group of peple commented on the topic ‘one should put on a mask when having a flu’. The result is summarized in the following table. (Each person could only choose one response.)

Response	**Frequency**
Agree	148
Disagree	35
No comment	67

If a person is chosen at random from this group of people, find the probability that

(a) the person’s response is either ‘agree’ or ‘disagree’,

(b) the person is not against to put on a mask when having a flu.

某組人士參與了一次有關「應在患有感冒時佩戴口罩」的論壇，結果如下表所示：

答覆	頻數
贊成	148
不贊成	35
無意見	67

(每位人士只能選擇一個答覆。)

若從該組人士中隨意選出一位，求

(a) 此人選擇「贊成」或「不贊成」的概率；

(b) 此人不反對「應在患有感冒時佩戴口罩」的概率。

8. Mary is choosing a new umbrella in a shop. The table below shows the probability of the colours she will choose.

Colour of the umbrella	Black	Red	Yellow	Blue	Green	White
Probability	0.08	0.21	0.32	0.27	0.11	0.01

Find the probability that she chooses

(a) a black or white umbrella,

(b) a red or blue umbrella.

慧玲正在商店裏選購雨傘。下表所示為她所選擇的顏色的概率：

雨傘的顏色	黑	紅	黃	藍	綠	白
概率	0.08	0.21	0.32	0.27	0.11	0.01

求她選擇以下顏色的雨傘的概率。

(a)黑色或白色

(b)紅色或藍色

9. Four coins are tossed. Find the probability of getting at least one tail.

當投擲四枚硬幣一次時，求最少有一枚硬幣反面向上的概率。

10. Two dice are thrown. Find the probability that the sum of the two numbers are smaller than 11.

當投擲兩枚骰子一次時，求所得的點數小於 11 的概率。

11. It is given that class *A* has 21 boys and 19 girls, while class *B* has 22 boys and 20 girls. If one representative is chosen at random from each class, find the probability that the two representatives are boys.

已知 *A* 班有 21 名男生和 19 名女生，而 *B* 班則有 22 名男生和 20 名女生。若從每班隨意選出一名代表，求二人皆是男生的概率。

12. Box *A* contains 2 white balls, 4 black balls and 6 red balls. Box *B* contains 5 white balls, 6 black balls and 7 red balls. One ball is drawn from each box at random. Find the probability that both balls are

(a) red,

(b) black,

(c) of the same colour.

盒子 *A* 裏有 2 個白球、4 個黑球和 6 個紅球，而盒子 *B* 裏則有 5 個白球、6 個黑球和 7 個紅球。現分別從各盒子中隨意抽出一個球，求下列事件的概率。

(a)抽得兩個紅球。

(b)抽得兩個黑球。

(c)抽得兩個顏色相同的球。

13. Three cards are drawn at random from a well-shuffled deck of 52 cards one after the other with replacement. Find the probability that

(a) all the three cards are red,

(b) at least one black card is drawn.

從一副 52 張的撲克牌中，先後隨意抽出 3 張，而每次都把抽出的牌放回。求下列事件的概率。

(a)抽出 3 張紅套牌。

(b)至少抽出 1 張黑套牌。

14. A survey on 'your favourite fast food shop' is carried out in a school and the result is recorded below:

Fast food shop	Boy	Girl
Hamburger Queen	240	160
Fairwell	54	72
Café de Mary	102	96
Delimexico	87	242

(Each student can only choose one fast food shop.)

A student is chosen at random from the group.

(a) If the student's favourite fast food shop is 'Hamburger Queen', find the probability that the student is a boy.

(b) If the student is a girl, find the probability that her favourite fast food shop is 'Delimexico'.

(c) If the student's favourite fast food shop is 'Fairwell', find the probability that the student is a girl.

某校進行了一項關於「你最喜愛的快餐店」的調查，結果如下：

快餐店	男生	女生
漢堡皇后	240	160
快餐之霸	54	72
大吃喝	102	96
麥迪先生	87	242

(每名學生只能選擇一個快餐店。)

現從該組學生中隨意選出一位。

(a)若該學生最喜愛「漢堡皇后」，求他是一名男生的概率。

(b)若該學生是一名女生，求她最喜愛「麥迪先生」的概率。

(c)若此學生最喜愛「快餐之霸」，求她是一名女生的概率。

15. The probabilities that Alan passes the Chinese, English and Mathematics examination are $\frac{2}{3}, \frac{3}{4}$ and $\frac{1}{2}$ respectively. Find the probability that he passes exactly two of the three subjects in the examination.

在一次考試中，卓榮在中文科、英文科和數學科取得及格成績的概率分別為 $\frac{2}{3}$、$\frac{3}{4}$ 和 $\frac{1}{2}$。求他只能在其中兩科取得及格成績的概率。

16. A family has two children and one of them is a boy. Find the probability that both of them are boys.
某家庭裏有兩個孩子，而其中一個為男孩。求兩個皆是男孩的概率。

17. Two cards are drawn at random from a deck of 52 cards without replacement. If the first card drawn is the king of spades, find the probability that the second card drawn is

(a) also a king,

(b) a face card.

從一副 52 張撲克牌中先後隨意抽出兩張牌，而每次都不把抽出的牌放回。若第一張抽出的為黑桃「K」，求下列事件的概率。

(a)第二張抽出的牌亦是一張「K」。

(b)第二張抽出的牌亦是一張人面牌。

18. In a city, 55% of the population is male. The percentages of left-handed males and females in the population are 5% and 8% respectively. If a person is selected at random, find the probability that the person is left-handed.

在某城市中，55% 的市民是男性。已知 5% 的男性和 8% 的女性皆是慣用左手的。若從該城市中隨意選出一名市民，求此人是慣用左手的概率。

19. Two cards are selected randomly from a deck of 52 playing cards without replacement. Find the probability that

(a) two red cards are drawn,

(b) the first one is an ace and the second one is a queen.

從一副 52 張的撲克牌中，先後隨意抽出兩張，而每次都不把抽出的牌放回。求下列事件的概率。

(a)抽得兩張紅套牌。

(b)抽得一張「A」及第二張抽得「Q」。

20. There are 8 red socks and 6 white socks in a drawer. Peter randomly takes out 2 socks from the drawer in the dark without replacement.

(a) What is the probability that the socks taken out are both red?

(b) What is the probability that the socks taken out are of the same colour?

抽屜裏有 8 隻紅襪和 6 隻白襪。力新隨意地從抽屜中抽出兩隻襪子，而每次都不把抽出的襪子放

回。求下列事件的概率。

(a) 取出兩隻紅襪。

(b) 取出兩隻顏色相同的襪子。

21. Three dice are thrown. Find the probability that

(a) all the three numbers are all odd,

(b) the product of the three numbers is even.

當投擲三枚骰子一次，求下列事件的概率。

(a) 所得的點數皆是奇數。

(b) 所得的點數的積是偶數。

22. Box *A* contains 40 batteries, 10 of which are defective. Box *B* contains 30 batteries, 5 of which are defective. The batteries in the two boxes are mixed and one battery is selected at random.

(a) If the selected battery is defective, what is the probability that it comes from box *A*?

(b) If the selected battery is non-defective, what is the probability that it comes from box *A*?

盒 *A* 裏有 40 枚電池，而其中 10 枚是壞的；而盒 *B* 則有 30 枚電池，而其中 5 枚是壞的。現把兩盒電池混在一起，然後隨意抽出一枚電池。

(a) 已知抽出的電池是壞的，求它原先在盒 *A* 的概率。

(b) 已知抽出的電池是沒有壞的，求它原先在盒 *A* 的概率。

23. Team *A* and team *B* enter the final of a basketball competition. The team which wins 3 games first would be the champion of the competition. Statistics shows that team *A* has a probability of 0.55 to win a game.

(a) Find the probability that team *A* wins the competitions by playing

(i) 3 matches,

(ii) 4 matches

(iii) 5 matches.

(b) Hence find the probability that team *A* wins the competition.

(Give your answers correct to 3 significant figures.)

A 隊和 *B* 隊進入了一項籃球比賽的決賽，其中能首先勝出 3 場比賽的球隊，便會成為冠軍。從往績顯示，*A* 隊勝出一場比賽的概率為 0.55。

(a) 求 *A* 隊在下列情況中奪得冠軍的概率。

(i) 經過 3 場比賽

(ii) 經過 4 場比賽

(iii) 經過 5 場比賽

(b) 由此，求 *A* 隊奪得冠軍的概率。

(答案須準確至三位有效數字。)

Pre-requisite Questions
預備測驗

1. If a die is thrown, find the probability the number is

(a) equal to 2,

(b) less than 8,

(c) greater than 6.

當投擲一枚骰子一次時，求擲得下列結果的概率。

(a)「2」

(b)小於 8 的點數

(c)大於 6 的點數

2. A loaded die is thrown 1000 times with the results recorded below:

Number	1	2	3	4	5	6
Frequency	137	243	242	87	103	188

Find the experimental probability of getting

(a) a '3',

(b) an even number,

(c) a prime number.

從英文字「MILLENNIUM」中隨意選出一個字母，求選出

(a)字母「L」的概率；

(b)一個元音字母的概率；

(c)一個子音字母的概率。

3. A letter is chosen randomly from the word 'MILLENNIUM'. Find the probability of getting

(a) an 'L',

(b) a vowel,

(c) a consonant.

從英文字「MILLENNIUM」中隨意選出一個字母，求選出

(a)字母「L」的概率；

(b)一個元音字母的概率；

(c)一個子音字母的概率。

4. A sock is drawn randomly from a drawer containing two pairs of white socks, three pairs of black socks and one pair of blue socks. Find the probability of drawing

(a) a white sock,

(b) a black sock,

(c) a red sock.

抽屜裏有 2 對白襪、3 對黑襪和 1 對藍襪。若從抽屜中隨意抽出一隻襪子，求下列事件的概率。

(a)抽出一隻白襪

(b)抽出一隻黑襪

(c)抽出一隻紅襪

5. A card is drawn at random from a well-shuffled deck of 52 cards. Find the probability that it is

(a) an ace of spades,

(b) a club,

(c) a red card.

從一副洗勻的 52 張撲克牌中隨意抽出一張牌，求抽出

(a)一張黑桃「A」的概率；

(b)一張梅花的概率；

(c)一張紅套牌。

6. One biased coin and one fair coin are thrown 100 times. The results are recorded in the following table.

Result	No head	1 head only
No. of occurrence	45	35

Find the experimental probability of getting

(a) 2 heads,

(b) 2 tails.

下表所示為同時投擲一枚不勻稱硬幣和一枚勻稱硬幣 100 次的結果：

結果	沒有正面向上	一個正面向上
發生的次數	45	35

求下列事件的實驗概率。

(a)擲得兩個正面向上

(b)擲得兩個反面向上

7. A die is thrown 1000 times, in which '2' shows up 105 times. Find

(a) the theoretical probability of getting a '2',

(b) the experimental probability of getting a '2'.

投擲一枚骰子 1000 次，其中擲得「2」的次數為 105 次。求

(a)得出一個「2」的理論概率；

(b)得出一個「2」的實驗概率。

8. Mrs. Chan has two sons and one daughter. Find the probability that the daughter is the eldest.

陳太太有 2 個兒子和 1 個女兒。求該女兒是三個孩子中最年長的概率。

9. Two fair coins are thrown, find the probability of getting

(a) two heads,

(b) two tails,

(c) exactly one head.

當投擲兩枚勻稱的硬幣一次時，求下列事件的概率。

(a)擲得兩個正面向上。

(b)擲得兩個反面向上。

(c)只擲得一個正面向上。

10. A die is thrown, find the probability of getting

(a) an even number,

(b) an odd number,

(c) a prime number.

當投擲一枚骰子一次時，求擲得下列結果的概率。

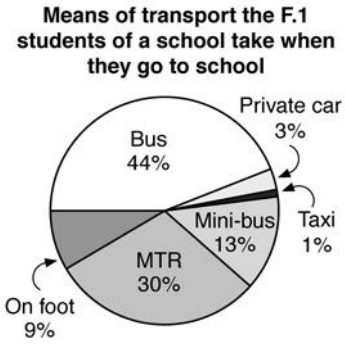
(a)一個偶數

(b)一個奇數

(c)一個質數

Level 1 Questions
程度 1 題目

1. The pie chart shows the different means of transport the F.1 students of a school take when they go to school. If a student is chosen at random from the school, find the probability that he goes to school



(a) by bus,

(b) by taxi,

(c) by bus or taxi,

(d) neither by mini-bus nor MTR.

右面的圓形圖顯示某校的中一學生上學時所乘搭的交通工具。若從該校隨意選出一名中一學生，求該學生

(a)乘巴士上學的概率；

(b)乘計程車上學的概率；

(c)乘巴士或計程車上學的概率；

(d)不乘小巴或地鐵上學的概率。

2. Three fair coins are thrown. Find the probability of getting

(a)3 tails,

(b)exactly 2 heads.

當投擲三枚勻稱的硬幣時，求下列事件的概率。

(a)三枚硬幣的反面向上。

(b)只有兩枚硬幣的正面向上。

3. The following table shows the distribution of weights of 100 men in a body check-up activity.

Weight / kg	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89
Frequency	18	$2x + 1$	20	12	13	x

(a) Find x.

(b) For a man who joined the body check-up activity, find the probability that his weight is

(i) between 59.5 kg and 79.5 kg,

(ii) between 39.5 kg and 49.5 kg.

下表所示為一次健康檢查活動中，100 名人士的體重分佈：

體重 / kg	30 – 39	40 – 49	50 – 59	60 – 69	70 – 79	80 – 89
頻數	18	$2x + 1$	20	12	13	x

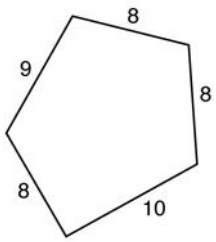
(a)求 x 的值。

(b)求參與這次健康檢查活動的人士中，符合下列體重要求的實驗概率。

(i)介乎 59.5 kg 與 79.5 kg

(ii)介乎 39.5 kg 與 49.5 kg

4. An ant travels around the perimeter of a pentagon and stops at a random location. What is the probability that it lands on the longest side?
一隻螞蟻沿着右圖中的五邊形的周界爬行，並隨意地停下。求該螞蟻停在五邊形中最長的邊上的概率。



5. If 97XX is a 4-digit number where the last two digits are equal, what is the probability that it is divisible by 3?
若 97XX 是一個四位數，而其中最後的兩個數字相等，求它能被 3 整除的概率。

6. Two cards are drawn at random from a deck of 52 well-shuffled cards. If the first card drawn is a black number card, what is the probability that the second card drawn is the ace of clubs?
從一副 52 張的撲克牌中隨意先後抽出兩張牌。若第一張牌是一張黑套的數字牌，求第二張牌是梅花「A」的概率。

7. There are three balls, one is red, one is yellow and one is green. They are put into three urns *A*, *B* and *C* at random such that each urn will contain one ball. Find the probability that the green ball is in urn *C*, the yellow ball is in urn *B* and the red ball is in urn *A*.
現有三個不同顏色的球，一個是紅色、一個是黃色，而另一個是綠色的。若把這三個顏色球隨意地分別放進壺 *A*、壺 *B* 和壺 *C* 裏，求綠球在壺 *C*、黃球在壺 *B*，而紅球在壺 *A* 的概率。

8. Two dice are thrown. Find the probability that the sum is greater than 7 given
(a) there is a '4',
(b) there is a '5'.
當投擲兩枚骰子一次時，若已知其中一枚為下列的點數，求點數之和大於 7 的概率。
(a)「4」
(b)「5」

9. Two people are playing rock-paper-scissors. What is the probability that a single game ends with a draw?
兩個人進行一局「包－剪－錘」遊戲，求結果是和局的概率。

10. Two dice are thrown. Find the probability that the sum of the two numbers is
(a) even,
(b) equal to 7,
(c) a prime number.
當投擲兩枚骰子一次時，求所得點數之和是下列結果的概率。
(a)一個偶數

(b)「7」

(c)一個質數

11. A tetrahedral die with numbers 2, 4, 6, 8 is rolled twice. Find the probability that the sum of the numbers is

(a) an even number, **(b)** an odd number, **(c)** 10.

投擲一枚刻有 2、4、6 和 8 的正四面體骰子兩次，求所得點數之和是

(a) 一個偶數的概率；

(b) 一個奇數的概率；

(c) 10 的概率。

12. There are four F.1 classes in a school:

Class	1A	1B	1C	1D
No. of students	32	36	32	40
No. of students wear glasses	16	12	12	8

A F.1 student in the school is then chosen at random. Find the probability that the student does not wear glasses.

假設某校有四班中一學生。

班別	1A	1B	1C	1D
學生數目	32	36	32	40
佩戴眼鏡的學生數目	16	12	12	8

若從該校隨意選出一名中一學生，求該學生沒有佩戴眼鏡的概率。

13. A 3-digit number is formed by arranging 2, 3 and 4 at random. Find the probability that the number is greater than 300.

假設某三位數是由 2、3 和 4 三個數字所組成的。求該三位數大於 300 的概率。

14. Two dice are thrown. What is the probability that the sum of the two numbers is even if only one of the numbers is '3'?

已知當投擲兩枚骰子時，只有一枚骰子的點數是「3」。求點數之和是偶數的概率。

15. One letter is chosen from each of the words 'COOKIES' and 'CAKES', find the probability that the two letters chosen are vowels.

從英文字「COOKIES」和「CAKES」中分別隨意選出一個字母，求所得的皆是元音字母的概率。

16. Two fair dice are thrown. Find the probability that the sum of the two numbers is

(a) a prime number,

(b) a multiple of 3,

(c) a prime number or a multiple of 3,

(d) neither a prime number nor a multiple of 3.

當投擲兩枚骰子一次時，求所得點數之和是下列各數字的概率。

(a) 一個質數的概率

(b)一個 3 的倍數

(c)一個質數或一個 3 的倍數

(d) 既非質數亦非 3 的倍數

17. A dice is thrown three times. What is the probability of getting

(a) three '6',

(b) no '6',

(c) three even numbers.

當投擲一枚骰子三次時，求下列事件的概率。

(a) 擲得三次「6」。

(b)三次均未能擲得「6」。

(c) 擲得三次偶數。

18. In playing the board game 'Monopoly', each player takes turn rolling the die. If a player rolls a '6', he is given another chance to roll the die. However, if a player rolls three '6' consecutively, he has to return to the starting point. Given that Nancy is playing 'Monopoly', find the probability that, in a single turn, she

(a) moves 10 blocks forward,

(b) moves 15 blocks forward,

(c) return to the starting point.

進行「大富翁」遊戲時，每位玩家會輪流投擲骰子。若某位玩家擲得「6」，他會被給予多擲一次的機會。可是，若玩家連續擲得三次「6」，他的棋子將被趕會回起點處。已知婉瑩在進行「大富翁」遊戲，求她在某輪投骰中發生下列事件的概率。

(a)她的棋子向前移動 10 步。

(b)她的棋子向前移動 15 步。

(c)她的棋子被趕回起點。

19. Mary is attempting three multiple choice questions. Each of them has five choices. If Mary answers the questions by wild guessing, find the probability that she gets

(a) all correct,

(b) all wrong,

(c) exactly one question wrong.

綺玲利用瞎猜的方法回答了三條多項選擇題。若每條問題有五個選擇，而其中只有一個是正確答案，求下列事件的概率。

(a) 綺玲答對所有題目。

(b) 綺玲答錯所有題目。

(c) 綺玲只答錯一條題目。

20. The probability of getting a '3' for a biased die is 0.2. If this biased die is thrown three times, find the probability of getting

(a) three '3', **(b)** no '3', **(c)** exactly two '3'.

當投擲一枚不勻稱的骰子時，擲得「3」的概率是 0.2。若投擲該枚骰子三次，求下列事件的概率。

(a) 擲得三次「3」。

(b) 三次均未能擲得「3」。

(c) 其中兩次擲得「3」。

Level 2 Questions

程度 2 題目

1. The chance of getting a head in tossing a biased coin is $\frac{2}{5}$. If the biased coins is tossed twice, what is the probability of getting

   (a) two tails,

   (b) one head and one tail.

   當投擲一枚不勻稱硬幣一次時，得到正面向上的概率是 $\frac{2}{5}$ 。若投擲該枚硬幣兩次，求下列事件的概率。

   (a) 擲得兩次反面向上。

   (b) 擲得一次正面向上及一次反面向上。

2. There are 4 exits in a school. Find the probability that two students, Tom and Susan, will not use the same exit to enter and leave the school in a school day.
某校有 4 個閘門。求慧琪和家樂在上學及放學時所使用的閘門皆不相同的概率。

3. In a group of 6 students, what is the probability that at least two students having the birthdays in the same month? (Assume that the probability for a student born in every month are the same, and give your answer correct to 2 decimal places.)
某興趣小組裏有 6 名學生。假設每名學生在每一個月出生的概率相同，求最少有 2 名學生的出生日期是在同一個月的概率。(答案須準確至二位小數。)

4. Three dice are thrown. Find the probability that

   (a) there are no even numbers,

   (b) the three numbers are the same,

   (c) there are at least two even numbers.

當投擲三枚骰子一次時，求下列事件的概率。

(a) 沒有擲得偶數。

(b) 三枚骰子的點數相同。

(c) 最少擲得兩個偶數。

5. There are 5 red balls and 3 green balls in a bag. Balls are drawn one by one at random without replacement until a green ball is drawn. Find the probability of getting a green ball in the

(a) first trial,

(b) third trial,

(c) fifth trial.

一個袋子裏有 5 個紅球和 3 個綠球。現每次從袋中隨意抽出一個球，並不把抽出的球放回，直至抽出一個綠球為止。求在下列情況中抽出綠球的概率。

(a) 抽第一次

(b) 抽第三次

(c) 抽第五次

6. There are four F.1 classes in a school:

Class	1A	1B	1C	1D
No. of students does not wear glasses	25	28	27	32
No. of students wear glasses	15	17	13	13

A F.1 class in the school is chosen at random, and a student is then randomly chosen. Find the probability that the student does not wear glasses.

假設某學校有四班中一學生。

班別	1A	1B	1C	1D
沒有佩戴眼鏡的學生數目	25	28	27	32
佩戴眼鏡的學生數目	15	17	13	13

若隨意從四班中一學生中選出一班，並在該班中隨意選出一名學生。求該名學生沒有 佩戴眼鏡的概率。

7. One letter is chosen from each of the words ‘CERTIFICATE’ and ‘MATHEMATICS’, find the probability that the two letters chosen are

(a) vowels,

(b) the same,

(c) different.

從英文字「CERTIFICATE」和「MATHEMATICS」中分別隨意選出一個字母，求下列事件的概率。

(a) 抽出兩個元音字母。

(b) 抽出兩個相同的字母。

(c) 抽出兩個不相同的字母。

8. Three dice are thrown. It is known that at least one even number shows up. Find the probability that the sum of the numbers is even.

當投擲三枚骰子一次時，若最少有一枚骰子的點數是偶數，求所得點數之和是偶數的概率。

9. 20 balls numbered 1 to 20 are put in a box. Two balls are drawn at random without replacement. If the number on the first ball drawn is a multiple of 4, find the probability that the number on the second ball drawn is

(a) also a multiple of 4,

(b) a multiple of 7.

盒子中有 20 個分別寫上 1 至 20 的球。現從盒子中先後抽出兩個球，而每次不把抽出的球放回。若第一個球是一個 4 的倍數，求下列事件的概率。

(a) 第二個球亦是一個 4 的倍數。

(b) 第二個球是一個 7 的倍數。

11. Three dice are thrown. What is the probability that the sum of the three numbers is even if only one of the numbers is a '3'?

當投擲三枚骰子一次時，若只有一枚骰子的點數是「3」，求所得點數之和是偶數的概率。

12. The government recruitment examination consists of two parts, part I and part II. One has to pass the part I examination in order to sit for the part II examination. John is going to apply for a government job. The probability that John passes a examination on a sunny day is $\frac{3}{5}$ while on a rainy day is $\frac{1}{4}$.

Suppose the probability of a sunny day is $\frac{2}{3}$ and a rainy day is $\frac{1}{3}$, find the probability that

(a) part I examination is held on a sunny day and John passes,

(b) John passes part I examination,

(c) John passes both parts of the examinations.

政府的招聘考試共有兩個部分：第一部分和第二部分。與考者要通過第一部分考試才能參加第二部分考試。建強現正申請一個政府職位。若建強在晴天考試，他的及格概率是 $\frac{3}{5}$ ；而在雨天考試的及格概率是 $\frac{1}{4}$ 。假設考試日是晴天的概率是 $\frac{2}{3}$ ，而是雨天的概率是 $\frac{1}{3}$ 。求下列事件的概率。

(a) 第一部分考試在晴天舉行，而建強取得及格成績。

(b) 建強通過第一部分考試。

(c) 建強通過第一和第二部分考試。

13. Alan and Grace are playing basketball. The probability that Alan makes a shot is $\frac{3}{5}$ while that for Grace is $\frac{1}{3}$. Suppose each of them are going to shoot twice, find the probability that

(a) there is at least one shot made,

(b) there is exactly one shot made,

(c) there is at least two shot made.

浩峰和嘉麗在打籃球。浩峰每次投籃的命中概率是$\frac{3}{5}$，而嘉麗每次投籃的命中概率是$\frac{1}{3}$。若他們各投籃兩次，求下列事件的概率。

(a) 最少有一球命中。

(b) 只有一球命中。

(c) 最少有兩球命中。

14. There are two bags. Bag *A* contains 1 red marble, 1 blue marble and 2 green marbles. Bag *B* contains 2 red marbles and 2 blue marbles. Vincent chooses one bag at random and then a marble is drawn randomly from the selected bag.

(a) Find the probability that the marble drawn is

(i) green,

(ii) red.

(b) Suppose Vincent puts the marble drawn from the selected bag into the other bag, and then randomly draws a marble from that other bag. What is the probability that the second marble drawn is of

(i) the same colour as the first marble,

(ii) different colours from the first marble.

現有袋子兩個。袋 *A* 中有 1 粒紅色彈子、1 粒藍色彈子和 2 粒綠色彈子。袋 *B* 中有 2 粒紅色彈子和 2 粒藍色彈子。若志宏隨意選取一個袋子，並從該袋子中隨意抽出一粒彈子。

(a)求下列事件的概率。

(i)抽出一粒綠色彈子。

(ii)抽出一粒紅色彈子。

(b)假設志宏將抽出的彈子放進另一個袋子中，並再從該袋子中隨意抽出一粒彈子。求下列事件的概率。

(i)第二粒彈子與第一粒的顏色相同。

(ii)第二粒彈子與第一粒的顏色不相同。

15. Calvin and Sarah are throwing two darts at a target respectively. In every shot, the probability that Calvin hits the target is $\frac{3}{5}$ while that for Sarah is $\frac{1}{4}$. If 1 point for a dart is hit and no point for a dart is missed, find the probability that

(a) Calvin gets 1 point,

(b) Sarah gets 1 point,

(c) Calvin and Sarah get equal points,

(d) Sarah gets a higher point than Calvin.

在一個遊戲中，偉康和美玲各投擲兩枝飛鏢。已知偉康和美玲能成功把飛鏢擲中鏢靶的概率分別是$\frac{3}{5}$和$\frac{1}{4}$。若把飛鏢擲中鏢靶可獲得 1 分，而擲不中鏢靶將不獲分數，求下列事件的概率。

(a) 偉康獲得 1 分。

(b) 美玲獲得 1 分。

(c) 偉康和美玲的分數相同。

(d) 美玲的分數高於偉康。

16. A problem is solved independently by Alfred, Sam and Andrew. The probability that the problem can be solved by them are $\frac{4}{7}, \frac{1}{3}$ and $\frac{3}{5}$ respectively. Find the probability that

(a) all three of them can solve the problem,

(b) exactly one of them can solve the problem,

(c) the problem can be solved.

(d) If one of them are selected randomly to solve the problem, find the probability that the problem can be solved.

小強、永倫和振興各自嘗試解答同一個難題。已知小強、永倫和振興能成功解題的概率分別是$\frac{4}{7}$、$\frac{1}{3}$和$\frac{3}{5}$。求下列事件的概率。

(a)三人皆能解決難題。

(b)只有一人能解決難題。

(c)該難題被成功解決。

(d)若在三人中隨意選出一人解答難題，求該難題被成功解答的概率。

(a) P(all can solve the problem)

$= P$(Alfred solves and Sam solves and Andrew solves)

$= \frac{4}{7} \times \frac{1}{3} \times \frac{3}{5}$

$= \underline{\underline{\frac{4}{35}}}$

(b) P(exactly one of them can solve the problem)

$= P$('only Alfred solves' or 'only Sam solves' or 'only Andrew solves')

$= P$(only Alfred solves) + P(only Sam solves) + P(only Andrew solves)

$$= \frac{4}{7} \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{3}{5}\right) + \left(1 - \frac{4}{7}\right) \times \frac{1}{3} \times \left(1 - \frac{3}{5}\right) + \left(1 - \frac{4}{7}\right) \times \left(1 - \frac{1}{3}\right) \times \frac{3}{5}$$

$$= \underline{\underline{\frac{8}{21}}}$$

(b) P(the problem can be solved)
= 1 – P(no one can solve the problem)
= 1 – P(Alfred cannot and Sam cannot and Andrew cannot)

$$= 1 - \left(1 - \frac{4}{7}\right) \times \left(1 - \frac{1}{3}\right) \times \left(1 - \frac{3}{5}\right)$$

$$= \underline{\underline{\frac{31}{35}}}$$

(c) P(the problem can be solved)
= P('Alfred and solve' or 'Sam and solve' or 'Andrew and solve')
= P(Alfred and solve) + P(Sam and solve) + P(Andrew and solve)

$$= \frac{1}{3} \times \frac{4}{7} + \frac{1}{3} \times \frac{1}{3} + \frac{1}{3} \times \frac{3}{5}$$

$$= \underline{\underline{\frac{158}{315}}}$$

17. Three light bulbs *A*, *B*, and *C* are connected in series in a circuit. The probabilities that the light bulbs are defective are $\frac{1}{2}, \frac{1}{3}$ and $\frac{1}{4}$ respectively.

(a) Find the probability that

(i) both light bulbs *B* and *C* are defective,

(ii) only light bulb *A* is defective.

(b) Given that the circuit does not work unless all the light bulbs are not defective, find the probability that

(i) the circuit works,

(ii) the circuit does not work given light bulb *A* is not defective.

電路中的三個燈泡 *A*、*B* 和 *C* 都是串聯的。假設這三個燈泡損壞的概率分別是 $\frac{1}{2}$ 、 $\frac{1}{3}$ 和 $\frac{1}{4}$ 。

(a)求下列事件的概率。

(i)燈泡 *B* 和燈泡 *C* 都是損壞的。

(ii)只有燈泡 *A* 是損壞的。

(b)若只有在三個燈泡皆不是損壞的情況下該電路才正常運作，求下列事件的概率。

(i)電路能正常運作。

(ii)已知燈泡 *A* 沒有損壞而電路不能正常運作。

18. There are two aquariums of fishes. In aquarium *A*, there are 3 goldfish, 4 clown fish and 1 butterfly fish. In aquarium *B*, there are 4 goldfish, 3 clown fish and 1 butterfly fish. Suppose a fish is randomly picked from aquarium *A* and put into aquarium *B*, then two fish is picked at random one by one from aquarium *B* and put into a new aquarium *C*. Find the probability that after the process,

(a) there is a butterfly fish in aquarium *A*,

(b) there is two butterfly fish in aquarium *B*,

(c) there is two butterfly fish in aquarium *C*,

(d) there is no butterfly fish in aquarium *B*.

現有魚缸兩個。魚缸 *A* 中有 3 尾金魚、4 尾小丑魚和 1 尾蝴蝶魚。魚缸 *B* 中有 4 尾金魚、3 尾小丑魚和 1 尾蝴蝶魚。現隨意從魚缸 *A* 中抽出一尾魚，把牠放進魚缸 *B* 後，再從魚缸 *B* 中隨意抽出兩尾魚，並放進新的魚缸 *C* 中。求完成以上程序後，下列事件的概率。

(a)魚缸 *A* 中有一尾蝴蝶魚。

(b)魚缸 *B* 中有兩尾蝴蝶魚。

(c)魚缸 *C* 中有兩尾蝴蝶魚。

(d)魚缸 *B* 中沒有蝴蝶魚。

Level 2+ Questions

程度 2+題目

1. Five cards are drawn at random without replacement from a deck of 52 well-shuffled cards. Find the probability of getting a hand of

(a) straight (A2345, 23456 or … or 10JQKA of any suits)

(b) flush (i.e. 5 cards of the same suit),

(c) straight flush (straight of the same suit).

從一副 52 張的撲克牌中先後抽出五張，而每次不把抽出的牌放回。求下列事件的概率。

(a)抽得一手順號牌 (即任何花色的 A2345、23456 或 … 或 10JQKA。)

(b)抽得一手同花牌 (即 5 張同一花色的牌。)

(c)抽得一手同一花色的順號牌。

2. A die is thrown three times. What is the probability that the three numbers obtained are consecutive terms in an arithmetic sequence?

當投擲一枚骰子三次時，求所得的點數能順序組成一個等差數列的概率。

3.There are 3 boys and 3 girls sitting around a round table. What is the probability that no two girls are sitting next to each other?

三名男生和三名女生圍着一張圓桌隨意就座。求沒有出現兩個女生坐在隔鄰的情況概率。

4. There are 9 black marbles and 1 white marble in a bag. Marbles are drawn one by one at random without replacement until a white marble is drawn.

(a) Find the probability of getting a white marble in the

(i) first trial,

(ii) second trial,

(iii) fifth trial.

(b) If there are *n* black marbles and 1 white marble in the bag, find the probability of getting a white marble in the

(i) first trial,

(ii) second trial,

(iii) *n*th trial.

袋中有 9 粒黑色彈子和 1 粒白色彈子。若每次從袋中抽出一粒彈子，並不把抽出的彈子放回，直至抽出一粒白色彈子為止。

(a)求在下列情況中抽出白色彈子的概率。

(i) 抽第一次

(ii) 抽第二次

(iii) 抽第五次

(b)若袋中有 n 粒黑色彈子和 1 粒白色彈子，求在下列情況中抽出白色彈子的概率。

(i)抽第一次

(ii)抽第二次

(iii)抽第 n 次

5. In a test, there are 4 multiple choice questions. Each question consists of 4 options. 1 mark will be awarded for each correct answer, but 1 mark will be deducted for each wrong answer. Suppose Wendy attempts all the questions by wild guessing, find the probability that she will get

(a) 0 mark,

(b) negative marks,

(c) at least 1 mark.

在一次測驗中有 4 條多項選擇題，而每條問題有四個選擇。每答對一條題目可獲 1 分，而每答錯一條題會被扣除 1 分。假設燕萍利用瞎猜的方法回答這四條多項選擇題，求下列事件的概率。

(a)她獲得 0 分。

(b)她獲得負分。

(c)她最少獲得 1 分。

6. Harry and Jane take turns throwing a dice. The one who first gets a '6' will win the game. Suppose Jane throws the dice first.

(a) Find the probability that Jane will win the game in her

(i) first trial,

(ii) second trial,

(iii) third trial.

(b) Find the probability that Jane wins the game in her nth trial.

(c) Find the probability that Jane will win the game.

在一個遊戲中，大安和佩詩輪流投擲一枚骰子，而首先擲得點數「6」的便是勝利者。假設佩詩先投擲骰子。

(a)求佩詩在下列情況中勝出的概率。

(i)她的第一次投擲

(ii)她的第二次投擲

(iii)她的第三次投擲

(b)求佩詩在第 n 次投擲時勝出的概率。

(c)求佩詩在遊戲中勝出的概率。

7. There are three fair coins, where one is a normal coin and two are two-headed coins. A coin is chosen at random and tossed.

(a) Find the probability that a head shows up.

(b) If it is given a head shows up, what is the probability that the two-headed coin is tossed?

(c) If a head shows up, this chosen coin is tossed once more. If a tail shows up, a coin is chosen randomly again from the three coins and tossed. Find the probability of getting

(i) two heads in these two trials,

(ii) two tails in these two trials.

在 3 枚勻稱的硬幣中，其中 1 枚是普通硬幣，而餘下 2 枚是具有兩個正面的硬幣。現隨意從中選出一枚硬幣，並進行一次投擲。

(a)求擲得正面向上的概率。

(b)若已知該次投擲的結果是正面向上，求所擲的是一枚具有兩個正面的硬幣的概率。

(c)若擲得正面向上，則會再一次投擲該枚硬幣；若擲得反面向上，則會從該三枚硬幣中隨意再選出一枚，並進行另一次投擲。求

(i)擲得兩次正面向上的概率；

(ii)擲得兩次反面向上的概率。

8. 20 balls numbered 1 to 20 are put in a box. Two balls are drawn at random without replacement. If the number on the first ball drawn is a multiple of 4, find the probability that the number on the second ball drawn is

(a) a multiple of 5, **(b)** a multiple of 8.

盒子中有 20 個分別寫上 1 至 20 的球。現從盒子中先後抽出兩個球，而每次不把抽出的球放回。若第一個球是一個 4 的倍數，求下列事件的概率。

(a) 第二個球是一個 5 的倍數。

(b) 第二個球是一個 8 的倍數。

9. A factory producing computer chips has employed a QC checker. When a computer chip is defective, the probability that the QC engineer identifies it (a true defective) is 0.95. When the computer chip is not defective, the probability that the QC engineer identify as defective (false defective) is 0.02. Suppose 0.5% of the computer chips produced is defective.

(a) Find the percentage of the computer chips that would show a

(i) true defective result,

(ii) false defective result.

(b) If a computer chip is identified as defective, what is the probability that it is a true defective? (Give your answer correct to 3 significant figures.)

(c) If 1000 computer chips are produced each day, find the expected number of computer chips that are falsely identified as defective? (Give your answer correct to the nearest integer.)

某生產電腦晶片的工廠聘請了一名品質檢查員。當一枚電腦晶片是不合規格時，該名品質檢查員檢定為不合規格(真瑕疵)的概率是 0.95；當一枚電腦晶片是合規格時，該名品質檢查員檢定為不合規格

(偽瑕疵)的概率是 0.02。假設該工廠生產的的電腦晶片有 0.5%是不合規格的。

(a)問出現下列情況的百分數是多少？

(i)真瑕疵結果

(ii)偽瑕疵結果

(b)若一枚電腦晶片被檢定為不合規格，求該結果是真瑕疵的概率。(答案須準確至三位有效數字。)

(c)若該工廠每天製造 1000 枚電腦晶片，求偽瑕疵的晶片數目的期望值。(答案須準確至最接近的整數。)

10.There are 10 empty boxes. 5 balls are going to put one by one into a randomly selected box. Find the probability that

(a) all the 5 balls are in 5 different boxes,

(b) all the 5 balls are in the same box,

(c) two of the boxes each contains 2 balls,

(d) one of the boxes contains 3 balls.

現有 10 個空的箱子。若將 5 個球逐一隨意放在其中一個箱子中，求下列事件的概率。

(a)5 個球在 5 個不同的箱子中。

(b)5 個球在同一個箱子中。

(c)有兩個箱子盛有 2 個球。

(d)有一個箱子盛有 3 個球。

Multiple Choice Questions
多項選擇題

1. In a class, there are 16 girls and 24 boys. $\frac{1}{4}$ of the girls and $\frac{3}{8}$ of the boys wear glasses. If a student is selected at random, what is the probability that he/she wears glasses?

某班有 16 個女生和 24 個男生。其中 $\frac{1}{4}$ 的女生和 $\frac{3}{8}$ 的男生是佩戴眼鏡的。若從該班中隨意選出一人，求該名學生佩戴眼鏡的概率。

A. $\frac{5}{8}$

B. $\frac{3}{10}$

C. $\frac{27}{40}$

D. $\frac{13}{40}$

2. The probability that Connie and Stephen will be absent from school are $\frac{1}{4}$ and $\frac{3}{8}$. Find the probability that neither of them are absent from school.

佩君和嘉輝缺席上學的概率分別是 $\frac{1}{4}$ 和 $\frac{3}{8}$。求二人均沒有缺席上學的概率。

A. $\frac{3}{32}$

B. $\frac{5}{32}$

C. $\frac{9}{32}$

D. $\frac{15}{32}$

3. Five persons Tom, Peter, Jason, May and Susan sit randomly around a round table. The probability that May does not sit next to Susan is

小慧、家麗、卓詩、偉康和可怡圍着一張圓桌隨意就座。求可怡不是坐在家麗隔鄰的概率。

A. $\frac{1}{2}$

B. $\frac{2}{3}$

C. $\frac{3}{4}$

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

4. The probability of getting a head for a biased coin is $\frac{1}{3}$. If that biased coin is tossed twice, find the probability of getting two tails.

投擲一枚不勻稱硬幣，而得出正面向上的概率是 $\frac{1}{3}$。若投擲該枚硬幣兩次，求擲得兩次反面向上的概率。

A. $\frac{1}{9}$

B. $\frac{2}{9}$

C. $\frac{4}{9}$

D. $\frac{8}{9}$

5. The probability that Paul, Kitty and Alice can finish a test in one hour are $\frac{1}{2}$, $\frac{2}{3}$ and $\frac{3}{4}$ respectively. Find the probability that only Paul cannot finish the test.

國華、子健和小芬能夠在一小時內完成測驗的概率分別是$\frac{1}{2}$、$\frac{2}{3}$和$\frac{3}{4}$。求只有國華不能完成測驗的概率。

A. $\frac{1}{3}$

B. $\frac{1}{4}$

C. $\frac{1}{6}$

D. $\frac{1}{12}$

6. In the World Cup Final between Brazil and Italy, the probability that Brazil wins, Italy wins or a draw in 90 minutes are all equal. Find the probability that no extra time is needed for the final.
在巴西隊對意大利隊的世界盃決賽中，巴西隊勝出的概率、意大利隊勝出的概率，及兩隊在 90 分鐘內賽和的概率都是相等的。求該場決賽不需加時決勝的概率。

A. $\frac{1}{2}$

B. $\frac{1}{3}$

C. $\frac{2}{3}$

D. $\frac{1}{4}$

7. Two dice are thrown. Find the probability that the sum of the numbers is less than or equal to 10.
當投擲兩枚骰子時，求所得點數之和等於或小於 10 的概率。

A. $\frac{5}{6}$

B. $\frac{11}{12}$

C. $\frac{23}{24}$

D. $\frac{35}{36}$

8. A fair die is thrown twice. Find the probability that the first number is a prime number and the second number is divisible by 3.
當投擲一枚勻稱的骰子兩次時，求第一次的點數是一個質數，而第二次的點數是一個 3 的倍數的概率。

A. $\frac{1}{6}$

B. $\frac{5}{6}$

C. $\frac{5}{36}$

D. $\frac{13}{36}$

9. A bag contains 30 balls numbered 1 to 30. Two balls are drawn without replacement. Find the probability that both balls are divisible by 3.
袋子中有 30 個分別寫上 1 至 30 的球。現從袋子中先後隨意抽出兩個球，而每次都不把抽出的球放回。求這兩個球皆能被 3 整除的概率。

A. $\frac{1}{3}$

B. $\frac{1}{5}$

C. $\frac{3}{29}$

D. $\frac{10}{29}$

10. There are 5 black marbles and 7 white marbles in a urn. Two marbles are drawn randomly one by one without replacement. Find the probability that they are of the same colour.
壺中有 5 粒黑色彈子和 7 枚白色彈子。現

從壺中先後隨意抽出兩粒彈子，而每次都不把抽出的彈子放回。求這兩粒彈子的顏色相同的概率。

A. $\frac{7}{22}$

B. $\frac{5}{33}$

C. $\frac{31}{66}$

D. $\frac{35}{66}$

11. An aeroplane has four engines. The plane can operate with at least one engine. Suppose all the engines work independently and each engine has the probability of 0.1 to be malfunction. Find the probability that the plane can operate.
一架飛機有四個引擎，而該架飛機能夠在只有一個引擎運作下飛行。假設四個引擎是獨立運作的，而每個引擎不能運作的概率均是 0.1。求該飛機能夠飛行的概率。

A. 0.0009

B. 0.0099

C. 0.0999

D. 0.9999

12. Two dice are thrown. If the two numbers are both even, find the probability that the sum of the two numbers is 6.
當投擲兩枚骰子時，若兩枚骰子的點數皆是偶數，求所得點數之和是「6」的概率。

A. $\frac{1}{3}$

B. $\frac{1}{6}$

C. $\frac{1}{9}$

D. $\frac{2}{9}$

13. A shopkeeper has 10 keys, only one of which can open the shop. If the keys are chosen at random one by one without repetition, find the probability that he can open the door in less than 3 trials.
一名店主有 10 條鑰匙，其中只有 1 條能成功開啟店鋪大門。他隨意選出一條鑰匙來試開大門，在不把鑰匙放回的情況下，直至能把大門打開為止。求他能在少於 3 次嘗試下便能夠開啟大門的概率。

A. $\frac{1}{5}$

B. $\frac{1}{9}$

C. $\frac{1}{10}$

D. $\frac{19}{90}$

14. There are 5 questions in a test. 3 of them are true-or-false questions and 2 of them are multiple choice questions with 4 options. If Billy answers all the questions by wild guessing, find the probability that he gets only one answer wrong.
測驗中有 5 條問題，其中 3 條是是非題，而餘下的 2 條是有四個選擇的多項選擇題。若文傑利用瞎猜的方法回答所有問題，求他只答錯一條問題的概率。

A. $\frac{3}{32}$

B. $\frac{3}{64}$

C. $\frac{3}{128}$

D. $\frac{9}{128}$

15. There are 3 fair coins where one is a two-headed coin and two are normal coins. If a coin is chosen at random and tossed one, find the probability of getting a head.

在 3 枚勻稱硬幣中，其中 1 枚是具有兩個正面的硬幣，而餘下的 2 枚是普通硬幣。現隨意從中選出一枚硬幣，並投擲一次。求擲得正面向上的概率。

A. $\frac{1}{2}$

B. $\frac{5}{9}$

C. $\frac{2}{3}$

D. $\frac{5}{6}$

16. A parachutist is landing on a circular target of 100 m in diameter. What is the probability that he is within 20 m from the centre of the target?
一名跳傘者正準備降落在直徑為 100 m 的圓形目標內。求該名跳傘者最終降落在距離圓形目標中心 20 m 範圍內的概率。

A. $\frac{1}{5}$

B. $\frac{1}{25}$

C. $\frac{4}{25}$

D. $\frac{16}{25}$

17. In a class, 40% of the students are girls. Given that 25% of the girls and 37.5% of the boys are choir members. If a student is chosen at random, find the probability that the student is NOT a choir member.
在某班中，有 40%的學生是女生。已知 25%的女生和 37.5%的男生是合唱團的成員。若從該班中隨意選出一人，求該名學生不是合唱團成員的概率。

A. 0.3

B. 0.325

C. 0.675

D. 0.7