

Exercise Sheet 2

1. In a class of 30 students, there are 17 girls and 13 boys. Five are A students, and three of these students are girls. If a student is chosen at random, what is the probability of choosing a girl or an A student?
2. A large basket of fruit contains 3 oranges, 2 apples and 5 bananas. If a piece of fruit is chosen at random, what is the probability of getting an orange or a banana?
3. In a country, 54% of people wear a seat belt while driving. If two people are chosen at random, what is the probability that both of them wear a seat belt?
4. A city survey found that 47% of teenagers have a part time job. The same survey found that 78% plan to attend college. If a teenager is chosen at random, what is the probability that the teenager has a part time job and plans to attend college?
5. In a school, 14% of students take drama and computer classes, and 67% take drama class. What is the probability that a student takes computer class given that the student takes drama class?
6. Four people are to be arranged in a row to have their picture taken. In how many ways can this be done?
7. An automobile manufacturer has four colors available for automobile exteriors and three for interiors. How many different color combinations can he produce?
8. What is the probability that at least 2 people in a group of 4 were born on the same day of the year?
9. There are three different routes connecting city A to city B. How many ways can a round trip be made from A to B and back? How many ways if it is desired to take a different route on the way back?

10. How many ways would 5 people be sitting around a circular table?
11. A deck of ordinary cards is shuffled and 13 cards are dealt. What is the probability that the last card dealt is a king?
12. A six-card hand is dealt from an ordinary deck of cards. Find the probability that:
- All six cards are hearts.
 - There are three aces, two kings, and one queen.
13. A lady wishes to color her fingernails on one hand using at most two of the colors red, yellow, and blue. How many ways can she do this?
14. Let $S = \{a, b, c\}$ be a sample space. Let $P(a)=1/2$, $P(b)=1/3$, and $P(c)=1/6$. Find the probabilities for all eight subsets of S .
15. Give a possible sample space S for each of the following experiments:
- An election decides between two candidates A and B.
 - A two-sided coin is tossed.
 - A student is chosen at random from a class of ten students.
16. Describe in words the events specified by the following subsets of $S = \{HHH, HHT, HTH, HTT, THH, THT, TTH, TTT\}$.
- $E_1 = \{HHH, HHT, HTH, HTT\}$
 - $E_2 = \{HHH, TTT\}$
 - $E_3 = \{HHT, HTH, THH\}$.
17. What are the probabilities of the events described in Exercise 16?
18. A die is loaded in such a way that the probability of each face turning up is proportional to the number of dots on that face. (For example, a six is three times as probable as a two.) What is the probability of getting an even number in one throw?
19. Let A and B be events such that $P(A \setminus B) = 1/4$, $P(A) = 2/3$, and $P(B) = 1/2$. What is $P(A \text{ or } B)$?

20. A student must choose one of the subjects, art, geology, or psychology, as an elective. She is equally likely to choose art or psychology and twice as likely to choose geology. What are the respective probabilities that she chooses art, geology, and psychology?
21. If a coin is tossed a sequence of times, what is the probability that the first head will occur after the fifth toss?
22. The Poisson distribution with parameter $\lambda = 0.3$ has been assigned for the outcome of an experiment. Let X be the outcome function. Find $P(X = 0)$, $P(X = 1)$, and $P(X > 1)$.
23. In a bag, there are 20 balls numbered from 1 to 20. If a person selects one at random, what is the probability that the number printed on the ball will be a prime number greater than 3.