

Probability 1 - Exercises

Sheet 1

2026

- 1.1** John, Jim, Jay and Jack have formed a band that uses four different instruments.
- (a) If each boy can play all 4 instruments, how many different arrangements are possible?
 - (b) What if John and Jim can play all four instruments, but Jay and Jack can only play piano and drums?
- 1.2** In how many ways can 8 people be seated in a row if
- (a) there are no restrictions on the seating arrangement?
 - (b) persons A and B must sit next to each other?
 - (c) there are 4 men and 4 women, and no 2 men or 2 women can sit next to each other?
 - (d) there are 5 men and they must sit next to each other?
 - (e) there are 4 married couples, and each couple must sit together?
- 1.3** How many 5-card poker hands are there?
- 1.4** A dance class consists of 22 students, of which 10 are women, and 12 are men. If 5 men and 5 women are to be chosen and then paired off, how many results are possible?
- 1.5** A committee of 10, consisting of 3 Republicans, 3 Democrats, and 4 Independents, is to be chosen from a larger group of 7 Republicans, 6 Democrats, and 8 Independents. How many committees are possible?
- 1.6** How many different linear arrangements are there of the letters A,B,C,D,E,F,G for which
- (a) A is before B?
 - (b) A is before B and B is before C?
 - (c) A and B are next to each other, and C and D are also next to each other?
 - (d) E is not last in line?
- 1.7** There are 20 families in a community: 5 families have one child, 7 families have two, 4 families have three, 3 families have four, and 1 family has five.
- (a) If a family is chosen at random, what is the probability that there are i children in that family, $i = 1, 2, 3, 4, 5$?
 - (b) If a child is chosen at random, what is the probability that he or she comes from a family with i children, $i = 1, 2, 3, 4, 5$?
- 1.8** (a) We throw 5 balls into two urns. What is the probability that exactly one urn remains empty?
- (b) We throw 5 balls into 5 urns. What is the probability that exactly one urn remains empty?
- HW 1.9** We put 8 rooks (tower) randomly onto a chess board. What is the probability that none of the rooks can capture another?
- 1.10** There are 18 elks living in a forest, 5 of them are marked. If 4 elks are captured at random, what is the probability that of those captured exactly 2 will be marked?
- HW 1.11** We have 4 mint and 4 lemon flavoured candies. The 8 pieces of candy are distributed randomly between Anne and Barbara, such that each girl gets 4 pieces. What is the probability that
- (a) all the mint flavoured candies go to Anne?
 - (b) both girls get exactly 2 pieces of each kind?

- 1.12** A company consists of 8 women and 7 men. There are two men who are unwilling to serve together on a committee. We form a committee of 4 women and 3 men at random. What is the probability that the committee is capable of making decisions?
- 1.13** Consider an 8×6 grid. A directed path from the bottom left corner $(0,0)$ to the top right corner $(8,6)$ is a path that can only take steps to the right and up. There are land mines located at the points with coordinates $(2,3)$ and $(6,4)$. What is the probability that a random directed path hits a landmine?
- 1.14** An urn contains 3 red, 4 white, and 5 blue balls.
- (a) If five are drawn without replacement, what is the probability that all three colors appear in the sample?
 - (b) If five are drawn with replacement, what is the probability that all three colors appear in the sample?
- HW 1.15** There are three TV repairmen in a small town. The TV repairmen are equally popular, and the townspeople decide independently which one to call. Yesterday five televisions malfunctioned. What is the probability that
- (a) the first repairman does not receive a phone call?
 - (b) all repairmen receive a phone call?
- 1.16** There are n pairs of shoes in a closet. We chose $2r$ shoes randomly ($2r \leq n$). What is the probability that
- (a) there are no pairs chosen?
 - (b) there is exactly one pair chosen?
 - (c) there are exactly two pairs chosen?