1. Evaluate.

   a) $7!$ **b)** $_7P_1$ **c)** $_7C_1$

   d) $P(7, 7)$ **e)** $\begin{pmatrix} 7 \\ 2 \end{pmatrix}$ **f)** $C(7, 2)$

2. Use the binomial theorem to

   a) expand $(3x - 2y)^5$

   b) factor $2a^4 - 8a^3b + 12a^2b^2 - 8ab^3 + 2b^4$

3. If upper-case and lower-case letters are considered as different letters, how many six-letter computer passwords are possible

   a) with no repeated letters?

   b) with at least one capital letter?

4. In how many ways can 12 different cars be parked in the front row of a used-car lot if the owner does not want the red one beside the orange one because the colours clash?

5. What is the probability that a random integer between 1 and 50, inclusive, is not a prime number?

6. A computer expert estimates that the odds of a chess grand master defeating the latest chess-playing computer are 4:5. What is the probability that the chess master will win a match against the computer?

7. **a)** How many divisors of 4725 are there?

   b) How many of these divisors are divisible by 5?

8. Eight friends, three of whom are left-handed, get together for a friendly game of volleyball. If they split into two teams randomly, what is the probability that one team is comprised of

   a) all right-handed players?

   b) two right-handed and two left-handed players?

9. A manager interviews in random order five candidates for a promotion. What is the likelihood that the most experienced candidate will be interviewed first, followed by the second most experienced candidate?

10. If four decks of cards are shuffled together, what is the probability of dealing a 13-card hand that includes exactly two black 3s?

11. At Inglis Park in Owen Sound, you can see adult salmon jumping over a series of logs as they swim upstream to spawn. The salmon have a 0.6 probability of a successful jump if they rest prior to the jump, but only a 0.3 probability immediately after jumping the previous log. If the fish are rested when they come to the first log, what is the probability that a salmon will clear

    a) both of the first two logs on the first try without resting?

    b) all of the first four logs on the first try if it rests after the second jump?

12. The weather forecast calls for a 12% chance of rain tomorrow, but it is twice as likely that it will snow. What is the probability that it will neither rain nor snow tomorrow?

13. Sasha and Pedro meet every Tuesday for a game of backgammon. They find that after winning a game, Sasha has a 65% probability of winning the next game. Similarly, Pedro has a 60% probability of winning after he has won a game. Pedro won the game last week.

    a) What are the probabilities of each player winning this week?

    b) What is the probability of Pedro winning the game two weeks later?

    c) If Pedro and Sasha play 100 games, how many games is each player likely to win?