Exercise-set 2.
Solutions

1. a) 100,
   b) 100
   c) 36.

2. a) 0,
   b) $\binom{100}{10}$.

3. (a) yes, yes,
   (b) no, no,
   (c) no, yes,
   (d) no, yes.

4. 8 (the smallest possible and also realizable degree-sequence is 0,1,2,3,4,6).

5. 6, 10, 15 or 30.

6. There are $n-1$ odd degrees $\Longrightarrow$ $n-1$ is even, n is odd $\Longrightarrow$ one even degree in $\overline{G}$.

7. The number of edges between the vertices of degree ≤ 7 and the vertices of degree ≥ 16 is both ≤ 70 and ≥ 70 $\Longrightarrow = 70$ $\Longrightarrow$ $|E(G)| = 115$.

8. No: the number of edges between the vertices of degree 4 and 10 and the vertices of degree 16 is both ≤ 66 and ≥ 72, a contradiction.

9. Count the number of edges between the k vertices of highest degree and the rest in two ways.

10. There are 11 of them.

11. There are 2 of them.

12. a) There are 4 such graphs,
    b) there are 4 such graphs,
    c) there are 2 such graphs.

13. a) Yes, yes, no (should have 15/2 edges).
    b) No (should have 11 vertices and 55/2 edges).

14. There are 4 such graphs.

15. 6.

16. a) no, b) yes.

17. a) and b) are isomorphic, and c) is not isomorphic to them.

18. a) and b) are isomorphic to it, c) is not.

19. No. The underlying graph is a cycle, and the knights cannot change their order on it.