1. The first graph is not bipartite (contains 5-cycles), but the second graph is.
2. Deleting 2 edges are enough, but less is not, since 2 edge-disjoint odd cycles in $G$.
3. The graph determined by the knights and attacks is bipartite (the two classes are to the white and black squares), and each of its degrees is at least 2 $\implies$ there a degree $\geq 3$.
4. Yes (the two classes of vertices are sequences with an even or odd number of 1’s, resp.).
5. No (the complement contains a triangle).
6. The vertices cannot be divided into two classes (count the degrees).
7. Complete bipartite graphs are like that.
8. The graphs are exactly the odd cycles (so in particular $n$ must be odd). $G$ must contain an odd cycle (otherwise $\chi(G') = 2$), and cannot contain more vertices or edges.
9. $\omega(G) = 3 \implies \chi(G) \geq 3$, and $G$ can be colored with 3 colors $\implies \chi(G) \leq 3$.
10. $\omega(G) = 8$ (each row and column is a clique) $\implies \chi(G) \geq 8$, and $G$ can be colored with 8 colors (colors are diagonal) $\implies \chi(G) \leq 8$.
11. $G$ is bipartite (the two classes of vertices are the even and odd numbers, resp.) $\implies \chi(G) = 2$
12. $\omega(G) = 4 \implies \chi(G) \geq 4$, and $G$ can be colored with 4 colors $\implies \chi(G) \leq 4$.
13. a), b) $\omega(G) = 3 \implies \chi(G) \geq 3$, but $G$ cannot be colored with 3 colors (proof!) $\implies \chi(G) \geq 4$. $G$ can be colored with 4 colors $\implies \chi(G) \leq 4$.
14. $\omega(G) = 3 \implies \chi(G) \geq 3$, but $G$ cannot be colored with 3 colors (proof!) $\implies \chi(G) \geq 4$. $G$ can be colored with 4 colors $\implies \chi(G) \leq 4$.
15. $\chi(G) \geq \lceil n/2 \rceil$ (at most 2 vertices can get the same color), and $G$ can be colored with this many colors $\implies \chi(G) = \lceil n/2 \rceil$.
16. $\omega(G) = 10$ (any 10 consecutive numbers form a clique) $\implies \chi(G) \geq 10$, and $G$ can be colored with 10 colors (periodically) $\implies \chi(G) \leq 10$.
17. $\omega(G) = 5$ (\{1, 8, 15, 22, 29\} is a clique) $\implies \chi(G) \geq 5$, and $G$ can be colored with 5 colors $\implies \chi(G) \leq 5$.
18. $\omega(G) = 11$ (\{10, 11, \ldots , 20\} is a clique) $\implies \chi(G) \geq 11$, and $G$ can be colored with 11 colors $\implies \chi(G) \leq 11$.
19. $\omega(G) = 4$ (the powers of 2 form a clique) $\implies \chi(G) \geq 4$, and $G$ can be colored with 4 colors (using the same color between consecutive powers of 2) $\implies \chi(G) \leq 4$.
20. $\omega(G) = 11$ (prime numbers and 1 form a clique) $\implies \chi(G) \geq 11$, and $G$ can be colored with 11 colors $\implies \chi(G) \leq 11$.
21. $\omega(G) = 5 \implies \chi(G) \geq 5$, and $G$ can be colored with 5 colors $\implies \chi(G) \leq 5$.
22. $G$ is $K_{10}$ with a perfect matching deleted. $\omega(G) = 5 \implies \chi(G) \geq 5$, and $G$ can be colored with 5 colors $\implies \chi(G) \leq 5$.
23. $\omega(G) = 6$ (\{1, 4, 7, 8, 9, 10\} is a clique) $\implies \chi(G) \geq 6$, and $G$ can be colored with 6 colors $\implies \chi(G) \leq 6$.
24. YES. See exercise 12.
25. $\omega(G) = 50$ (even numbers form a clique) $\implies \chi(G) \geq 50$, and $G$ can be colored with 50 colors $\implies \chi(G) \leq 50$.
26. Use the greedy coloring in the original (increasing) order of the vertices.
27. Order the vertices: first the exceptional ones, then the rest, and use the greedy coloring.
28. Use the greedy coloring in the decreasing order of the degrees.