1. (a) not graphic (sum of the degrees is odd). (b) graphic. (c) graphic. (d) graphic.

2. The remaining degree must be between 0 and $7 - 1 = 6$ and odd since we must have an even number of odd degrees. This yields three possibilities: 1, 3 and 5. Applying Havel-Hakimi algorithm, we see that only degree 3 yields a graphic sequence.

3. Let G be any graph on p vertices, and let Δ and δ be the maximum and minimum degree of G, respectively. Then $\Delta \leq p - 1$ and $\delta \geq 0$. Suppose the degree sequence of G has all degrees different. Then it contains p integers (as many as there are vertices) between 0 and $p-1$. But there are exactly p integers between 0 and $p - 1$, therefore $\Delta(G) = p - 1$ and $\delta(G) = 0$. Hence, our graph must contain a vertex of degree 0, so a vertex of degree $\Delta(G)$ can be adjacent to at most $p - 2$ vertices. In other words, $\Delta \leq p - 2$. This is a contradiction. Thus, the degree sequence of any graph must contain a repeated element.

4. Graph G_3 is the only one not isomorphic to the cube graph Q_3, since it contains an odd cycle C_5 as a subgraph, which Q_3 does not (see below). To see that the other two graphs are isomorphic to Q_3, number the vertices so as to have the same set of edges. To see that Q_3 does not contain C_5 note that we can color the vertices of Q_3 with two colors so that no two vertices of the same color are adjacent. (This is especially easy to do with Q_3 drawn as G_1 if we color the top vertices with one color and the bottom vertices with the other color.) Obviously, we cannot do the same with C_5, so C_5 cannot be a subgraph of Q_3.