- This homework set has *three* questions, each one with increasing difficulty. You must work in pairs to determine the solutions.
- Every member of the team must be able to explain how you arrived at the answer.
- You may be asked to present your answer on the blackboard.

1. Let G be a graph with n vertices and m edges. How many vertex- and edge-induced subgraphs does G contain, respectively?
2. Determine the number of edges m, minimum degree $\delta(G)$, average degree $d(G)$, connectivity $k(G)$ and edge connectivity $\lambda(G)$ for the following graphs:
   (a) The path of length m, P_m.
   (b) The cycle on n vertices, C_n.
   (c) The complete graph on n vertices, K_n.
   (d) Let $d \in \mathbb{N}$ and $V := \{0,1\}^d$; thus, V is the set of all 0-1 sequences of length d. The graph on V in which two such sequences form an edge if and only if they differ in exactly one position is called the d-dimensional cube.
3. Show that every connected graph G contains a path of length at least $\min\{2\delta(G), |G| - 1\}$.