

Exercise sheet 12

1. How many graphs on the vertex set $V = \{1, \dots, n\}$ are there?
2. Draw the *butterfly graph* that is given by the adjacency matrix

$$\begin{pmatrix} 0 & 1 & 1 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 1 \\ 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 0 \end{pmatrix}$$

(If you are not sure, you can check your answer on wikipedia.)

3. In the butterfly graph above. Decide, whether the following exists.
 - a) A path that runs through all vertices.
 - b) A cycle that runs through all vertices.
 - c) A path that runs through all edges.
 - d) A trail that runs through all edges.
 - e) A circuit that runs through all edges.
4. Is the butterfly graph connected? Consider its subgraph induced by the vertex set $\{1, 2, 4, 5\}$. Is it connected?