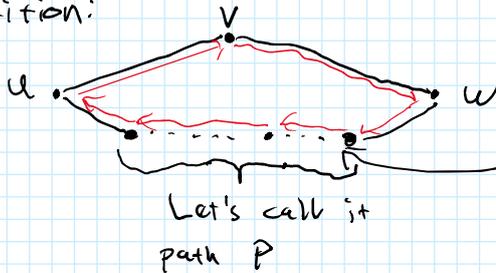


Exercise P1.1 – Connectivity

Let $G = (V, E)$ be a two connected graph.

- (a) Let (u, v, w) be a path in G of length 2. Show that we can extend this path to a cycle, that is, show that G contains a cycle where u, v, w appear as incident vertices.
- (b) Let $e \in E$ be an edge, and $u, v \in V$ be two vertices. Show that there is a path in G from u to v passing through e .
 (Hint: you may use without proof that in a 2-connected graph, every two edges e, f lie on a common cycle.)

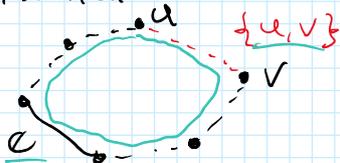
a) Intuition:



Satz von Menger:
2 vertex-disjoint paths betw. u, w

Let (u, v, w) be a path of length 2. By 2-connectedness of G , the Graph $G[V/v]$ is connected. Hence, there is a $u-w$ path P that doesn't contain v . Combining P and (u, v, w) gives the desired cycle.

b) Intuition:



$G' = (V, E \cup \{u, v\})$
is 2-connected \rightarrow use hint