• What is a maximal cycle in a graph $G$?

A subgraph of $G$ is a maximal cycle if it is isomorphic to a cycle and it is not a proper subgraph any other cycle in $G$.

But since cycles can not be subgraphs of each other, every cycle in $G$ is both maximal and minimal.

• Give an example of a graph where a maximal cycle is not the cycle with maximal length.

As mentioned before, every cycle is a maximal cycle. Hence, any graph with two cycles of different lengths would be an example. Namely the following graph

![Graph Diagram]

Has a cycle of length 3 which is a maximal cycle but it also has a cycle of length 5.

• Can a minimal cycle be longer than a maximal cycle?

Yes. In the above example. The cycle of length 3 is maximal and the cycle of length 5 is minimal. Again, this is because every cycle is both maximal and minimal.