

3 TGR homeworks — October 17th, 2018

3.1 Prove or disprove: *Every simple undirected graph G without loops with at least two vertices contains at least two vertices that are not cut vertices (are not articulations).*

3.2 Prove or disprove: *A connected simple undirected graph G without loops is 2-connected if and only if every pair of distinct edges of G is contained in a common circuit.*

3.3 Prove or disprove: *Denote by \mathcal{G} the class of all simple graphs without loops that do not contain a complete graph with 4 vertices. Let G be a graph in \mathcal{G} with n vertices that has the maximum number of edges among all graphs in \mathcal{G} with n vertices. Then the relation R defined on the set of vertices $V(G)$ by:*

$$u R v \quad \text{if and only if} \quad \{u, v\} \notin E(G)$$

is an equivalence relation on $V(G)$.