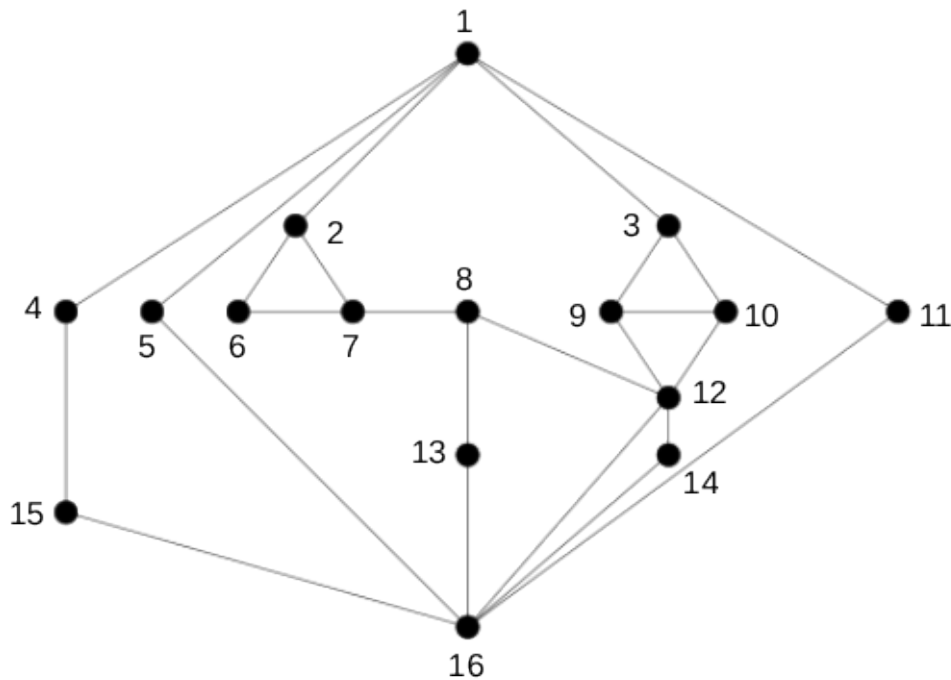


Exercise Set 4

Figure 4.1: Graph for exercise 4.1



Exercise 4.1. Find a maximum matching in the graph in Figure 4.1 together with a certificate for its maximality.

(3 points)

Exercise 4.2. Show that a graph G is factor-critical if and only if G is connected and for every vertex $v \in V(G)$ we have $\nu(G - v) = \nu(G)$.

(4 points)

Exercise 4.3. Let G be a 3-regular undirected graph.

- Assume G is simple. Show that there is a matching in G covering at least $(7/8) \cdot |V(G)|$ vertices.
- Give an example to prove that the bound of item (a) is tight.

(c) Show that the assumption that G is simple in item (a) is necessary.

(3+1+1 points)

Exercise 4.4. Let G be a k -vertex-connected graph which has neither a perfect nor a near-perfect matching.

(i) Show that $\nu(G) \geq k$.

(ii) Show that $\tau(G) \leq 2 \cdot \nu(G) - k$.

(2+2 points)

Deadline: November 10, before the lecture. The websites for lecture and exercises can be found at:

https://ecampus.uni-bonn.de/goto_ecampus_crs_2772883.html

In case of any questions feel free to contact me at armbruster@or.uni-bonn.de.