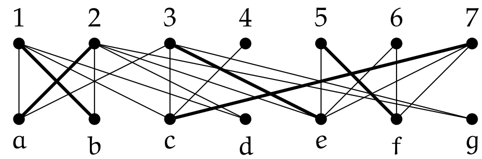
Our Hungarian Method

Use "Our Hungarian Method" to find a maximum matching in the bipartite graph below:

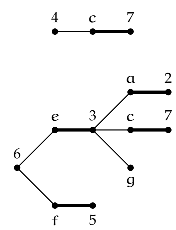


Run #1

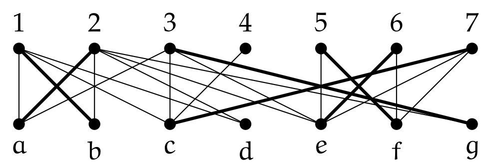
Vertices Not Saturated

$$X_0 = \{4, 6\}$$
$$Y_0 = \{d, g\}$$

Hungarian Forest



Flip Augmenting Path

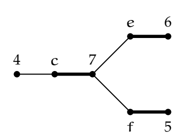


Run #2

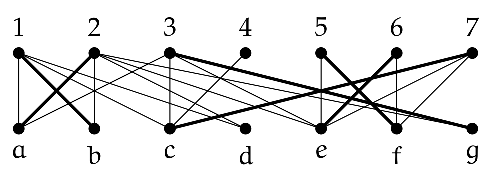
Vertices Not Saturated

$$X_0 = \{4\}$$
$$Y_0 = \{d\}$$

Hungarian Forest

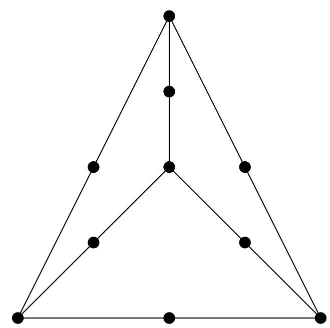


End Algorithm Since our Hungarian Forest has no M-augmenting path, the following matching is a maximum matching in the graph.

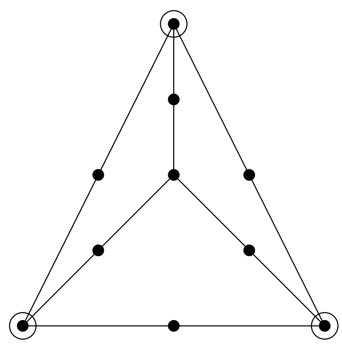


3.3.1

Determine whether the following graph has a 1-factor.

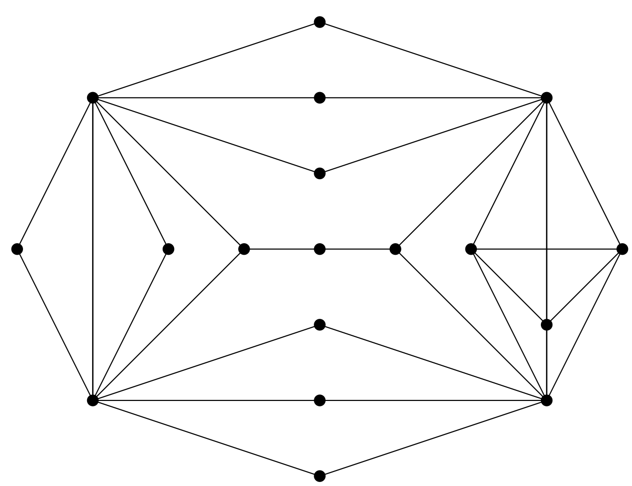


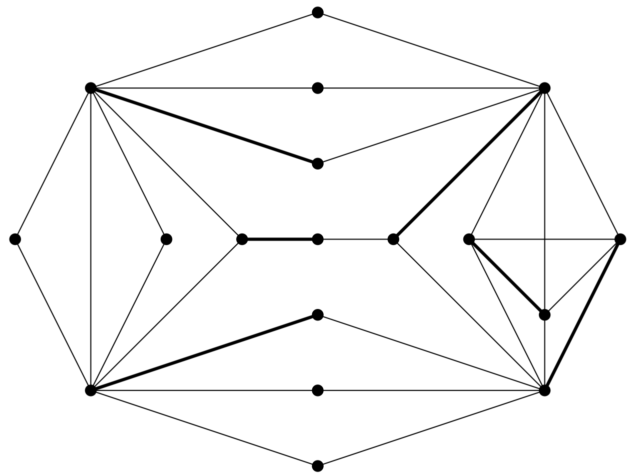
By letting S be the following set of vertices, we find that $q(G - S) > |S|$, so the graph does not satisfy Tutte's condition, meaning there is no 1-factor in the graph.



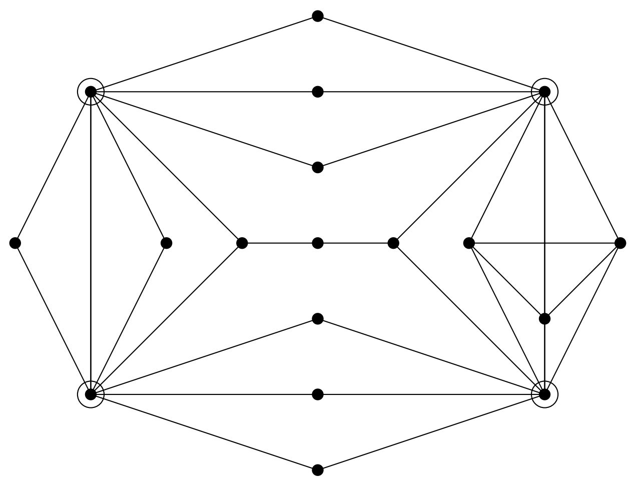
3.3.2

Exhibit a maximum matching in the graph below, and use a result in this section to give a short proof that it has no larger matching.





We can find the S such that $n(G) - d(S)$ is minimized (satisfying the Berge-Tutte formula) as follows:



This deletion yields 10 odd components, which means that we subtract $10 - 4 = 6$ off $n(G) = 18$ to get that there are 12 vertices covered in the maximum matching, which we have here.

3.3.5

Given graphs G and H, determine the number of components and the maximum degree of $G \vee H$.

Components There is 1 component in $G \vee H$.

Maximum degree The maximum degree of $G \vee H$ is $\max\{\Delta(G) + n(H), \Delta(H) + n(G)\}$.