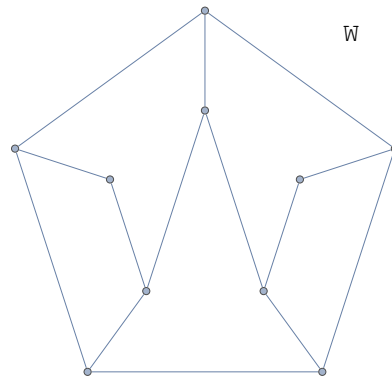


- (10 pts) For the sequences \mathcal{S}_1 and \mathcal{S}_2 given below, determine whether the sequence is graphic. If it is, give a graph that has \mathcal{S} as its degree sequence. If not, prove why there is no such graph with \mathcal{S} as its degree sequence.

$$(\mathcal{S}_1) = 3\ 3\ 2\ 2\ 2\ 2\ 1\ 1\ 0\ 0$$

$$(\mathcal{S}_2) = 6\ 4\ 3\ 2\ 1\ 1\ 1$$

- (10 pts) Prove that in every graph the number of vertices of odd degree is even.
- (10 pts) For this question, recall that $\omega(G)$ is the size of the largest complete graph that is a subgraph of G . We know that the chromatic number $\chi(G)$ is always greater than or equal to the clique number $\omega(G)$. Give an example of a graph that shows that these two values are not always equal, and give an explanation to back up your claim.
- (15 pts) This question deals with the following graph W .



- (10 pts) Find, with proof, the edge chromatic number $\chi'(W)$.
 - (5 pts) Does the graph W have a perfect matching decomposition? Why or why not?
- (15 pts) Question 5.
 - (4 pts) **Give** two non-isomorphic **spanning trees** of the wheel graph W_5 .
 - (5 pts) **Explain why** the two subgraphs you give are spanning trees.
 - (6 pts) **Prove** that the subgraphs you provide are not isomorphic.