Artificial Intelligence

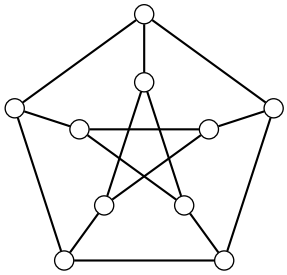
Assignment 2

Due date: December 31, 2023

Carefully organize your code and put comments Clearly state your assumptions (if any) at the beginning of your code For each problem you have to submit your solution (Python3 code) as a single `.py` file

A1. **Solving Graph Coloring Using SAT Solver** [10]

Recall that the vertex coloring of a graph can be encoded as a boolean formula. Encode the two-colorability decision problem on the Petersen graph as a satisfiability problem. Solve the constructed formula using a SAT solver (e.g. PySAT).



Petersen graph

A2. **Using Decision Tree for a Classification Task** [10]

Consider a labelled dataset (see the attached `students_data.csv` file) where the information about 1000 students are recorded. For each student, four pieces of information are kept, namely their marks (in percentage) in the 10th and 12th standards, class attendance (in percentage) in the AI course, and marks (in percentage) in other subjects, as well as their pass/fail status in the AI course. Given this dataset, your task is to construct a decision tree classifier for the pass/fail binary decision task. Split the dataset into two (random) parts, where 70% of the data is used for training and the remaining 30% is used to validate the constructed classifier. Display the performance of the constructed classifier using a confusion matrix. Also print the other performance metrics such as precision, recall, f1-score and support.