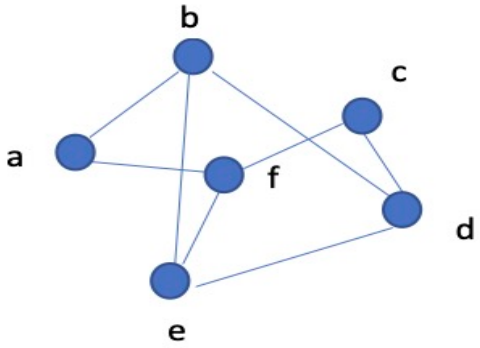
FINAL Jan 18, 2021
A. Birturk, F. Polat, H. Oguz 30 minutes



Q-5) {*30 points*} Consider the graph G given above to answer the questions below.

a) What is the number of non-zero entries in the incidence matrix representation of G?

b) Does G have a complete graph with at least three vertices as a subgraph? If yes, give this subgraph.

c) Is G a bipartite graph? Yes / No. If yes explain briefly; If no, which edges need to be removed such that the resulting subgraph of G will be a bipartite graph.

d) Is G a planar graph? Yes / No. Explain briefly.

e) How many graphs are there that are isomorphic to G having the same set of vertices as G (including G itself)?

f) How many directed graphs are there that have G as their underlying undirected graph?

g) What is the length of the longest simple path in G? Give this path.

h) What is the number of connected components of G? Explain your answer.

i) Is there an Euler circuit in G? If yes, give such a circuit; if no, state the reason.

j) Is there an Euler path in G? If yes, give such a path; if no, state the reason.

k) Does G have a Hamilton circuit? If yes, find such a circuit; if no, justify your answer.

l) Does G have a Hamilton path? If yes, find such a path; if no, justify your answer.

m) What is the number of non-zero entries in the adjacency matrix representation of G?

n) Draw all subgraphs of G, if any, that are isomorphic to C_4 (cycle graph with 4 vertices).

o) What is the graph chromatic number of G? Explain briefly.