

Due: Monday October 31st, 1pm.

You can assume that any graphs considered here or in subsequent assignments are finite.

1) 7.3.12

2) 7.3.9

3) 7.3.10

4) Suppose u, v, w are vertices of a graph G such that there is a path P_1 from u to v and a path P_2 from v to w and both P_1 and P_2 have an even number of edges. Is there a path P_3 from u to w with an even number of edges?

5) Suppose G is a graph with vertex set V and edge set E . Show that there are disjoint sets V_1, V_2 with $V = V_1 \cup V_2$ so that at most $|E|/2$ edges either have both endpoints in V_1 or both endpoints in V_2 .

6) Suppose G is a graph with vertex set V and edge set E . We say that G is *bipartite* if there are disjoint sets V_1, V_2 with $V = V_1 \cup V_2$ so that there are *no* edges that either have both endpoints in V_1 or both endpoints in V_2 . Show that G is bipartite if and only if it does not have any cycle with an odd number of edges as a subgraph.