CS473-6

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Create a graph G where each vertex represents a wrestler and each edge represents a rivalry. The graph will contain V vertices and E edges. Perform as many BFS's as needed to visit all vertices. Assign all wrestlers whose distance is even to be $babyfaces$ and all wrestlers whose distance is odd to be $heels$. Then check each edge to verify that it goes between a $babyface$ and a $heel$. For the BFS, $O(V)$ time to designate each wrestler as a $babyface$ or $heel$, and $O(E)$ time to check edges, which is $O(V + E)$ time overall.

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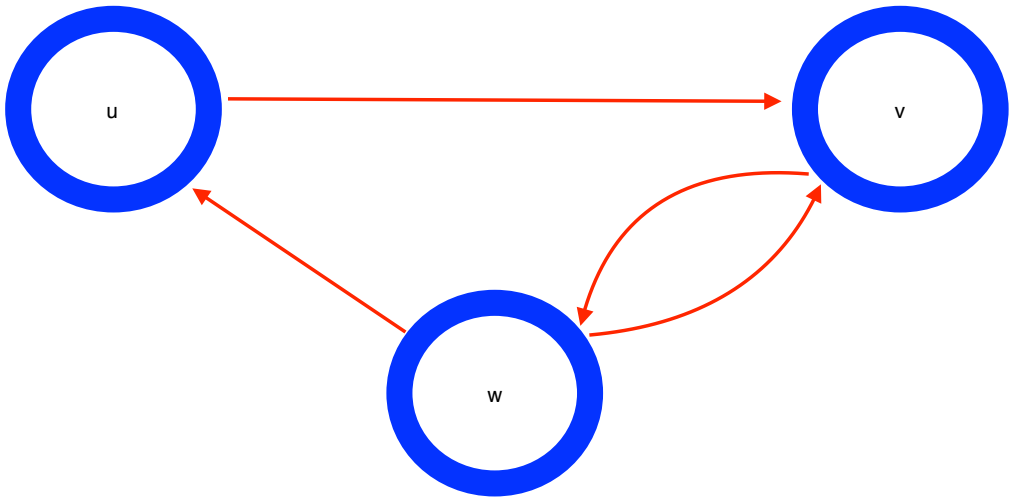
The statement is false. As a counter-example, consider the following graph:



Assume that a DFS run on this graph discovers w before it discovers u and v (which is always possible since the outer for loop of generic DFS considers the vertices in arbitrary order). Then u and v will be white at time $w.d$. Now assume that DFS explores edge wv before edge wu. Then wv and wu will be tree edges, which will make uv a cross edge.