

HW 3: due Thursday, September 27 in class

Note: for those interested in The Graceful Tree conjecture we mentioned last week, a survey on what is known can be found here:

<http://www.combinatorics.org/Surveys/ds6.pdf>

1. Show that if G has no even cycles, then each block of G is either K_1 , K_2 , or an odd cycle.
2. For each of the following two statements, prove or give a counterexample:
 - (a) Every k -connected graph is k -edge-connected.
 - (b) Every k -edge connected graph is k -connected.
3. Prove that if G is a 3-regular graph, then the size of a minimum vertex cut and the size of a minimum edge cut are the same.
4. Show that the Petersen graph is 3-connected (This is the graph that is on the top left of the course webpage, and also on the cover of the textbook).
5. We define the k -dimensional hypercube Q_k to be the following graph. There is a vertex for each binary string of length k . Two vertices are connected by an edge if and only if they differ in exactly one bit position. Prove that Q_k is k -edge-connected by finding k disjoint paths between any pair of vertices x and y in Q_k .