Algorithms and Complexity
Semester 2, 2012

Assignment 2

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This assignment is **due on Aug 14**. All submitted work must be *done individually* without consulting someone else's solutions in accordance with the University's "Academic Dishonesty and Plagiarism" policies.

Problem 1: Let $G = (V, E)$ be a connected undirected graph. The *disconnecting power* of a vertex u is defined as how many pairs of vertices in $G - u$ cannot reach one another. More formally, the disconnecting power of a vertex u can be defined as

$$\text{disconnecting power of } u = |\{x, y \in V - u \,:\, \nexists\ x\text{-}y \text{ path in } G - u\}|.$$

Notice that the disconnecting power of a vertex is strictly greater than zero if and only if it is a cut vertex.

Your task is to design an algorithm that computes the disconnecting power of every vertex in the graph. You algorithm should run in $O(n^2)$ time. If you cannot make the stated bound, you can get partial credit by submitting a slower algorithm.

You solution must include:

1. Statement of your algorithm in plain English. (Pseudo-code is optional.)
2. Short proof of correctness.
3. Time complexity analysis.