# Graph Essentials:Homework #1

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# Problem 1

Proof: Lemma2. In any directed graph, the summation of in-degrees is equal to the summation of out-degree.

## Solution

One edge must comes from a node and end in a node. So when a node has an out-degree, that means there is an edge, and the edge must have an end, that's the in-degree of an node. So, whenever there is an out-degree, there must exist an in-degree in the graph. So, for the graph, the in-degree and out-degree must the same.

# Problem 2

Give an efficient bridge detection algorithm.

## Solution

假如我们在DFS时访问到了u点， 此时图被u点分成两部分， 一部分是已经访问过的点， 另一部分是还没有访问的点。
如果u是割点， 那么未访问过的点中至少有一个点在不经过u点的情况下无法访问那些已经访问过的点。即， 对未访问过的点v进行DFS， 且不经过u点， 若能够访问到已访问过的点， 则u不是割点， 若不能访问到已访问过的点， 则u是割点。

参考资料:http://blog.csdn.net/wtyvhreal/article/details/43530613