Problem 1.

(a) Draw an uncompressed suffix trie for “banana$” and also mark the suffix links. Show the structure and node traversal path for each suffix insertion.

(b) Give a suffix tree (in linear-space format) for “banana$”. Your answer has to contain a correct label \([x, y]\) for each edge as well as the correct suffix link for each internal node.
Problem 2

斷頭指標
(a) Prove or disprove: 斷頭指標的起點 ↔ internal node
(b) Prove or disprove: 斷頭指標的終點 ↔ internal node
(c) Prove or disprove: 斷頭指標只有 O(|S|)個
(d) 可否不用到斷頭指標就能在線性時間內建出 suffix tree？試討論之
Problem 3.
The relationship between the suffix tree for a string $S$ and for the reverse string $S^r$ is not obvious. However, there is a significant relationship between the two trees. Find it and state it.

**Hint:** suffix links help.
Problem 4.

Suppose one must dynamically maintain a suffix tree for a string that is growing or contracting. Discuss how to do this efficiently if the string is growing (contracting) on the left end, and how to do it if the string is growing (contracting) on the right end.