1. **Pattern Matching** Compute the prefix function used in the Knuth-Morris-Pratt algorithm and the functions $\lambda$ and $\gamma$ used in the Boyer-Moore algorithm, for the pattern `shesellsseashells`. You may assume the alphabet is $\{a,e,h,l,s\}$.  

   2 marks

2. **Edit distance** The edit distance between two strings is defined as the number of elementary operations required to transform one string to the other. This is a useful tool used in bioinformatics and plagiarism detection software. We will suppose that the elementary operations are

   i. insert a character at any point in the string,
   ii. substitute any character with another at some point in the string, and
   iii. remove a character at any point in the string

   i) Describe a dynamic algorithm (similar to the LCS algorithm) to calculate the edit distance between two strings.

   ii) Justify why the algorithm always works

   iii) Describe the complexity of the algorithm.

   4 marks

3. **Point inside a polygon** The lecture notes provide a ray-tracing algorithm for determining whether a point is inside a simple polygon. This ray-tracing algorithm doesn’t deal with special case of the ray passing through a point. Describe a complete solution to this problem including:

   a) Pseudocode for the complete solution.

   b) A proof of correctness.

   c) An analysis of the complexity of the algorithm.

   4 marks

These tutorial exercises count for 4% of your final assessment. Ensure that you carry out the work yourself.