Imperial College London – Department of Computing

MSc in Computing Science

# 580: Algorithms
# Tutorial: Dynamic Programming

1. The array $A = [A_1, \ldots, A_N]$ contains $N$ integers.

   (a) A *prefix subarray* of $A$ is any continuous subarray that starts with $A[1]$. Write a $\Theta(N)$-time algorithm to find the greatest sum of any prefix subarray of $A$.

   (b) The greatest sum of *any* continuous subarray of $A$ can be found as follows. For each position $i$ in the array, find $s_i$, the maximum sum of any continuous subarray starting at $i$. The solution is then the maximum of those $s_i$ values. There are $N$ such values, so this method will take $\Theta(N^2)$ time using your answer for (1a). This is referred to as a *naive* solution.

   By conside $N$)-time solution to the proble