CSC236 Worksheet 7 Review

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Question 1

- Let n be the length of input s. Then $n \in \mathbb{N}$.

  The algorithm divides problem into 3 (roughly) equal parts, i.e. s_1, s_2, s_3, calls the function recursively 3 times on those parts, i.e. $r(s_1)$, $r(s_2)$, $r(s_3)$, divides the problem in constant time, and combines the result in time proportional to $\text{len}(s_3) + \text{len}(s_2) + \text{len}(s_1) = n$.

  Thus, $b = 3$, $a = 3$, $f = n$.

  Since $a = b = b^1$, the master's theorem tells us the time complexity of function r is $\Theta(n \log_3 n)$.

  The time complexity of copying the string elements in reverse order using loop is $\Theta(n)$.

  So, in comparison to the divide and conquer method, this is faster.