COS 488 Problem Set #6 Question #2

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As in the derivation for bitstrings, let $\mathcal{S}$ denote the class of strings with no occurrence of said string, and let $\mathcal{T}$ denote the class of strings with no occurrence of the string except at the end, where it occurs once. Then $\mathcal{S} + \mathcal{T} = \epsilon + \mathcal{S} \times (\sum \mathcal{Z}_m) \implies S(z) + T(z) = 1 + zMS(z)$ by considering what happens when adding one character to the end of $\mathcal{S}$. Meanwhile, adding the string to the end of S gives T along with every self-similar 'tail' per the book. As a result, $S(z)z^p = T(z)c(z)$ where $c(z)$ is the autocorrelation polynomial. Upon inspection, the string `THE QUICK BROWN FOX JUMPED OVER THE LAZY DOG` contains no autocorrelations, so $c(z) = 1$. As a result, since $M = 32$ and $p = 44$

$$S(z) + S(z)z^{44} = 1 + 32zS(z)$$
$$S(z) = \frac{1}{1 - 32z + z^{44}}$$

Expected number of characters? -2