Hashing

2/3 points earned (66%)

Retake

Course Home

Excellent!

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1 / 1 points

1.
What is the minimum size of an array that can be used in the direct addressing scheme to store a map from 7-digit phone numbers to names?

- [x] 10000000

Correct
Correct! 7-digit phone numbers correspond to integers from 0 to 9999999.

- [ ] 1000000
- [ ] 20000000

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0 / 1 points

2.
If it is guaranteed that the total length of all occurrences of a $Pattern$ in a $Text$ is at most L, which of the below estimates of the average running time of Rabin-Karp's algorithm to find all occurrences of the $Pattern$ in the $Text$ is the most tight out of the correct ones?

- [ ] $O(|Text| + |Pattern|)$
- [ ] $O(|Text||Pattern| + L)$
- [ ] $O(|Text| + |Pattern| + L)$
- [x] $O(|Text||Pattern|L)$

This should not be selected
There is a tighter correct estimate.

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1 / 1 points

3.

Let us slightly change the polynomial hash function for strings and set $h(S) = (\sum_{j=0}^{|S|-1} x^{|S|-1-j} S[j]) \bmod p$. Let us fix some $Text$ and some $Pattern$. Denote by $H[i]$ the hash function of the substring $Text[i..i+|Pattern|-1]$ of the $Text$ starting from position i and having the same length as $Pattern$ (for all appropriate positions i where the $Pattern$ can occur in the $Text$). Which of the below formulas is the correct recurrence to compute $H[i+1]$ given $H[i]$?

- $H[i+1] = (xH[i] + Text[i+|Pattern|] - x^{|Pattern|} Text[i]) \bmod p$

Correct

Correct! When we move one position to the right from position i, each term must increase the power of x in it by one, the first term $x^{|Pattern|} Text[i]$ must be subtracted after that, and a new term $Text[i+|Pattern|]$ must be added.

- $H[i+1] = (xH[i] + x^{|Pattern|} Text[i+|Pattern|] - Text[i]) \bmod p$
- $H[i+1] = (xH[i] + Text[i+|Pattern|-1] - x^{|Pattern|} Text[i]) \bmod p$
- $H[i] = (xH[i+1] + Text[i] - x^{|Pattern|} Text[i+|Pattern|]) \bmod p$