



✓ Congratulations! You passed!

TO PASS 60% or higher

Keep Learning

GRADE
100%

Hashing

TOTAL POINTS 3

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?

1 / 1 point

- ☒ 10000000
☐ 20000000
☐ 1000000

✓ Correct

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

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?

1 / 1 point

- ☒ $O(|Text| + |Pattern| + L)$
☐ $O(|Text||Pattern| + L)$
☐ $O(|Text||Pattern|L)$
☐ $O(|Text| + |Pattern|)$

✓ Correct

Correct! Estimate from the lecture is $O(|Text| + (q + 1)|Pattern|)$, where q is the number of occurrences of the *Pattern* in the *Text*, and $L = q|Pattern|$ in this case.

3. Let us slightly change the polynomial hash function for strings and set

1 / 1 point

$$h(S) = \left(\sum_{j=0}^{|S|-1} x^{|S|-1-j} S[j] \right) \bmod p.$$
 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 $H[i]$?

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

✓ 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.