

Midterm 2 Standard 24 - Hash tables, collisions

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1 Instructions

- The solutions **should be typed**, using proper mathematical notation. We cannot accept hand-written solutions. Here's a short intro to \LaTeX .
- You should submit your work through the **class Canvas page** only. Please submit one PDF file, compiled using this \LaTeX template.
- You may not need a full page for your solutions; pagebreaks are there to help Gradescope automatically find where each problem is. Even if you do not attempt every problem, please submit this document with no fewer pages than the blank template (or Gradescope has issues with it).
- You **may not collaborate with other students. Copying from any source is an Honor Code violation. Furthermore, all submissions must be in your own words and reflect your understanding of the material.** If there is any confusion about this policy, it is your responsibility to clarify before the due date.
- Posting to **any** service including, but not limited to Chegg, Discord, Reddit, StackExchange, etc., for help on an assignment is a violation of the Honor Code.

2 Standard 24 - Hash tables, collisions

2.1 Problem 1

Problem 1. For a chaining hash table with m buckets and a hash function $h()$ that satisfies the Simple Uniform Hashing Assumption, how many insertions must be made before we expect all m buckets to be non-empty?

Answer. By the Simple Uniform Hashing Assumption, we expect the length of each linked list in the hash table to have a length of (number of elements in hash table)/(number of buckets in hash table) and there are m buckets. So if we expect each list to have a length of 1 (non-empty), (number of elements in the hash table)/ m would equal 1 so there would be m elements inserted. \square