Part A): Creating Hash Table

Random AU ID numbers generated from https://www.random.org/integers/

1. **Hash Table:**

   42687 75858 30224 21858 97091 42532 63989 64301 0 38821
   89817 0 73141 26053 22954 32503 76706 39077 18680 22400
   33810 40073 33872 32043 0 43797 37194 81495 63454 96749
   82893 14877 24145 98672 64633

   The average number of probing in creating hash table:
   1.53125

2. Keys entered: 97091, 12345, 64301, 68815

   Code output:

   97091 found at index: 4
   12345 is NOT in the AUID list.
   64301 IS from the AUID list.
   68815 is NOT in the AUID list.
   Average number of probing in searching hash table: 6.75

Part B): Hash Table with a size of 50

1. **Hash Table:**

   42687 75858 42532 21858 0 63989 0 64301 0 38821 89817 0
   73141 26053 22954 32503 76706 39077 18680 22400 33810 40073
   33872 32043 0 43797 37194 81495 63454 96749 82893 14877
   24145 98672 64633 30224 97091 0 0 0 0 0 0 0 0 0 0 0 0 0

   The average number of probing in creating hash table: 1.25

2. Keys entered: 97091, 12345, 64301, 68815

   Code output:

   97091 found at index: 36
   12345 is NOT in the AUID list.
   64301 IS from the AUID list.
   68815 is NOT in the AUID list.
   Average number of probing in searching hash table: 4.5

Does the increase in hash table size decrease the number of probing? Explain Your findings.

The increase of the hash table size from 35 to 50 did decrease the number of probing for both creating and searching the hash table. This is because we still used the same amount of AUID's to calculate the averages. When calculating the probing averages, using a larger hash table size should result in a smaller average than an average that was calculated with a smaller hash table size because, as a rule of math, increasing the size of the total sample size while keeping the selected population size the same will result in said smaller average. Also, since there is more space on the hash table at size 50, there will be less collisions and less time needed in order to identify which inputted key is part of the AUID text file, thus the average will be smaller too.