In this question, you will insert following set of keys: 12, 56, 22, 106, 36, 72, 902, 86, 96, 62 and 42, to three different hash tables.

1. Draw the table resulted after inserting the keys to a table of size *N=10* (a non- prime table size), where we use the division method as a compression function. That is, the compression function is: *h2(k) = k mod 10*.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|  |  | 12,  22,  72,  902,  62,  42, |  |  |  | 56,  106,  36,  86,  96, |  |  |  |

1. Draw the table resulted after inserting the keys to a table of size *N=13* (a prime table size), where we use the division method as a compression function. That is, the compression function is: *h2(k) = k mod 13*.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
|  |  | 106 | 42 | 56 | 902,  96 |  | 72 | 86 | 22 | 36,  62 |  | 12 |

1. Draw the table resulted after inserting the keys to a table of size *N=10* (a non- prime table size), where we use the MAD method as a compression function. For the MAD constants, we picked are: *p=1009*, *a=125* and *b=342*. Therefore, the compression function is: *h2(k) = ((125\*k+342) mod 1009) mod 10*.

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
| 62 | 72 | 86 | 12 | 902,  96 | 22,  102 | 36 | 42 |  | 56 |

In this question, you will insert and delete items to/from a *N=11* length open- addressing hash table, where we use the division method for compression (the compression function is: *h2(k) = k mod 11*), and linear probing for resolving collisions.

* We start with the following insertions: 59, 39, 135, 91, 46, 132, 169 and 277

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 132 |  | 46 | 135 | 59 | 91 | 39 | 169 | 277 |  |  |

* We then delete: 39 and 46

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 132 |  | dummy | 135 | 59 | 91 | dummy | 169 | 277 |  |  |

* Finally, we insert: 157

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 132 |  | dummy | 135 | 59 | 91 | 157 | 169 | 277 |  |  |