1. Give the contents of the hash table that results when you insert items with the keys E A S Y Q U E S T I O N in that order into an initially empty table of M = 5 lists, using separate chaining with unordered lists. Use the hash function h(x) = k mod M to transform the kth letter of the alphabet into a table index, e.g., hash(I) = hash(9) = 9 % 5 = 4.

|  |  |
| --- | --- |
| Index | Keys |
| 0 | E, Y, E, T, O |
| 1 | A, U |
| 2 | Q |
| 3 |  |
| 4 | S, S, I, N |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 0 | 1 | 2 | 3 | 4 |
| E |  |  |  |  |
| E | A |  |  |  |
| E | A |  |  | S |
| Y | A |  |  | S |
| Y | A | Q |  | S |
| Y | U | Q |  | S |
| E | U | Q |  | S |
| E | U | Q |  | S |
| T | U | Q |  | S |
| T | U | Q |  | I |
| O | U | Q |  | I |
| O | U | Q |  | N |

2. Give the contents of the hash table that results when you insert items with the keys E A S Y Q U E S T I O N in that order into an initially empty table of size M= 16 using linear probing. Use the hash function h(x) = k mod M to transform the kth letter of the alphabet into a table index.

|  |  |
| --- | --- |
| Index | Keys |
| 0 |  |
| 1 | A |
| 2 | Q |
| 3 | S |
| 4 | S |
| 5 | E |
| 6 | U |
| 7 | E |
| 8 | T |
| 9 | Y |
| 10 | I |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 | N |
| 15 | O |

3. Give the contents of the hash table that results when you insert items with the keys E A S Y Q U E S T I O N in that order into an initially empty table of size M= 16 using quadratic hashing. Use the hash function h(x) = k mod M for the initial probe and the collision is resolved by finding an available position at (h(x) + i^2) % M), i=1, 2, ...

|  |  |
| --- | --- |
| Index | Keys |
| 0 |  |
| 1 | A |
| 2 | Q |
| 3 | S |
| 4 | S |
| 5 | E |
| 6 | U |
| 7 | N |
| 8 | T |
| 9 | Y |
| 10 | I |
| 11 |  |
| 12 |  |
| 13 |  |
| 14 | E |
| 15 | O |

4. What is the value of the Shift Folding Hash Function if K = 432-351-459-763-88 and TSize = 1000?

Index = (432 + 351 + 459 + 763 + 88) % 1000 = 2093 % 1000 = 93

5. What is the value of the Boundary Folding Hash Function if K = 432-351-459-763- 88 and TSize = 1000?

Index = (432 + 153 + 459 + 367 + 88) % 1000 = 1499 % 1000 = 499