**R-2.19 Answer:**

H k) = (2k + 5) mod 11

|  |  |
| --- | --- |
| **Key** | **H(K)** |
| 12 | 7 |
| 44 | 5 |
| 13 | 9 |
| 88 | 5 |
| 23 | 7 |
| 94 | 6 |
| 11 | 5 |
| 39 | 6 |
| 20 | 1 |
| 16 | 4 |
| 5 | 4 |

|  |  |
| --- | --- |
| **Index** | **Key** |
| 0 | ∅ |
| 1 | 20 |
| 2 | ∅ |
| 3 | ∅ |
| 4 | 16, 5 |
| 5 | 44, 88, 11 |
| 6 | 94, 83 |
| 7 | 12, 13 |
| 8 | ∅ |
| 9 | 13 |
| 10 | ∅ |

**R-2.20 Answer:**

|  |  |  |
| --- | --- | --- |
| **Key** | **H(K)** | **Probes** |
| 12 | 7 | 7 |
| 44 | 5 | 5 |
| 13 | 9 | 9 |
| 88 | 5 | 5->6 |
| 23 | 7 | 7->8 |
| 94 | 6 | 6->10 |
| 11 | 5 | 5->0 |
| 39 | 6 | 6->1 |
| 20 | 1 | 1->2 |
| 16 | 4 | 4 |
| 5 | 4 | 4->3 |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Key | 11 | 39 | 20 | 5 | 16 | 44 | 88 | 12 | 23 | 13 | 94 |
| Index | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] |

|  |  |  |
| --- | --- | --- |
| **Key** | **H(K)** | **Probes** |
| 12 | 7 | 7 |
| 44 | 5 | 5 |
| 13 | 9 | 9 |
| 88 | 5 | 5->6 |
| 23 | 7 | 7->8 |
| 94 | 6 | 6->10 |
| 11 | 5 | 5->3 |
| 39 | 6 | 6->1 |
| 20 | 1 | 1->2 |
| 16 | 4 | 4->2 |
| 5 | 4 | 4->??? |

**R-2.21 Answer:**

Quadratic probing formula: A [(i + j^2) mod N]

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Key |  | 20 | 16 | 11 | 39 | 44 | 88 | 12 | 23 | 13 | 94 |
| Index | [0] | [1] | [2] | [3] | [4] | [5] | [6] | [7] | [8] | [9] | [10] |

Quadratic probing can't find empty slot for 5 because after j=11 it repeats as the first 11 initial value.

**R-2.22 Answer:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Key** | **h(i)** | **H’(k)** | **Probes** |
| 12 | 7 |  | 7 |
| 44 | 5 |  | 5 |
| 13 | 9 |  | 9 |
| 88 | 5 | 3 | 3 |
| 23 | 7 | 5 | 1 |
| 94 | 6 |  | 6 |
| 11 | 5 | 3 | 8 |
| 39 | 6 | 3 | 4 |
| 20 | 1 | 1 | 2 |
| 16 | 4 | 5 | 0 |
| 5 | 4 | 2 | 10 |

1.) h(i) = (2i + 5) mod 11

2.) h’(k) = 7 – (k mod 7)

|  |
| --- |
| Algorithm removalLinearProbing**(**key**)**  Input**:** key to remove from  Output**:** remove and **return** the element    key**,** element**)** **<-** findElement**(**key**)**  If key **!=** NO\_SUCH\_KEY then  key **<-** AVAILABLE  **return** element  **return** NO\_KEY\_FOUND |
| Linear probing handles collision by putting the item in the next empty or available block. So, It is necessary to use a special marker to represent the deleted elements. If we remove it then we will not find the value that might be put in the next block after that because the search will end when it find an empty and not available block. |