

Practice - Hash tables

~~Always show all work~~~~Use 8 by 1 grid paper. Always show all work~~1. Given input 16, 38, 75, 91, 58, 25, hash function $h_1(x) = x \% 10$.

(a). Show the resulting closed hash table using linear probing.

$$h_1(16) = 6$$

$$h_1(38) = 8$$

$$h_1(75) = 5$$

$$h_1(91) = 1$$

$$h_1(58) = 8 \text{ (collision 1: try } 8 + D(1) = 8 + 1 = 9)$$

$$h_1(25) = 5 \text{ (collision 1: try } 5 + D(1) = 5 + 1 = 6;$$

$$\text{collision 2: try } 5 + D(2) = 5 + 2 = 7)$$

0	
1	91
2	
3	
4	
5	75
6	16
7	25
8	38
9	58

(b). Start over. Show the resulting closed hash table using quadratic probing.

$$h_1(16) = 6$$

$$h_1(38) = 8$$

$$h_1(75) = 5$$

$$h_1(91) = 1$$

$$h_1(58) = 8 \text{ (collision 1: try } 8 + D(1) = 8 + 1^2 = 9)$$

$$h_1(25) = 5 \text{ (collision 1: try } 5 + D(1) = 5 + 1^2 = 6;$$

$$\text{collision 2: try } 5 + D(2) = 5 + 2^2 = 9;$$

$$\text{collision 3: try } 5 + D(3) = 5 + 3^2 = 5 + 9 = 14 \rightarrow 4)$$

0	
1	91
2	
3	
4	25
5	75
6	16
7	
8	38
9	58

(c). Start over. Use double hashing with $h_2(x) = 7 - (x \% 7)$.

$$h_1(16) = 6$$

$$h_1(38) = 8$$

$$h_1(75) = 5$$

$$h_1(91) = 1$$

$$h_1(58) = 8 \text{ (collision 1: } h_2(58) = 7 - (58 \% 7) = 7 - 2 = 5$$

$$\text{collision 1: try } 8 + 1 \times 5 = 13 \rightarrow 3)$$

$$h_1(25) = 5 \text{ (collision 1: } h_2(25) = 7 - (25 \% 7) = 7 - 4 = 3$$

$$\text{collision 1: try } 5 + 1 \times 3 = 8;$$

$$\text{collision 2: try } 5 + 2 \times 3 = 11 \rightarrow 1;$$

$$\text{collision 3: try } 5 + 3 \times 3 = 14 \rightarrow 4)$$

0	
1	91
2	
3	58
4	25
5	75
6	16
7	
8	38
9	