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HW3

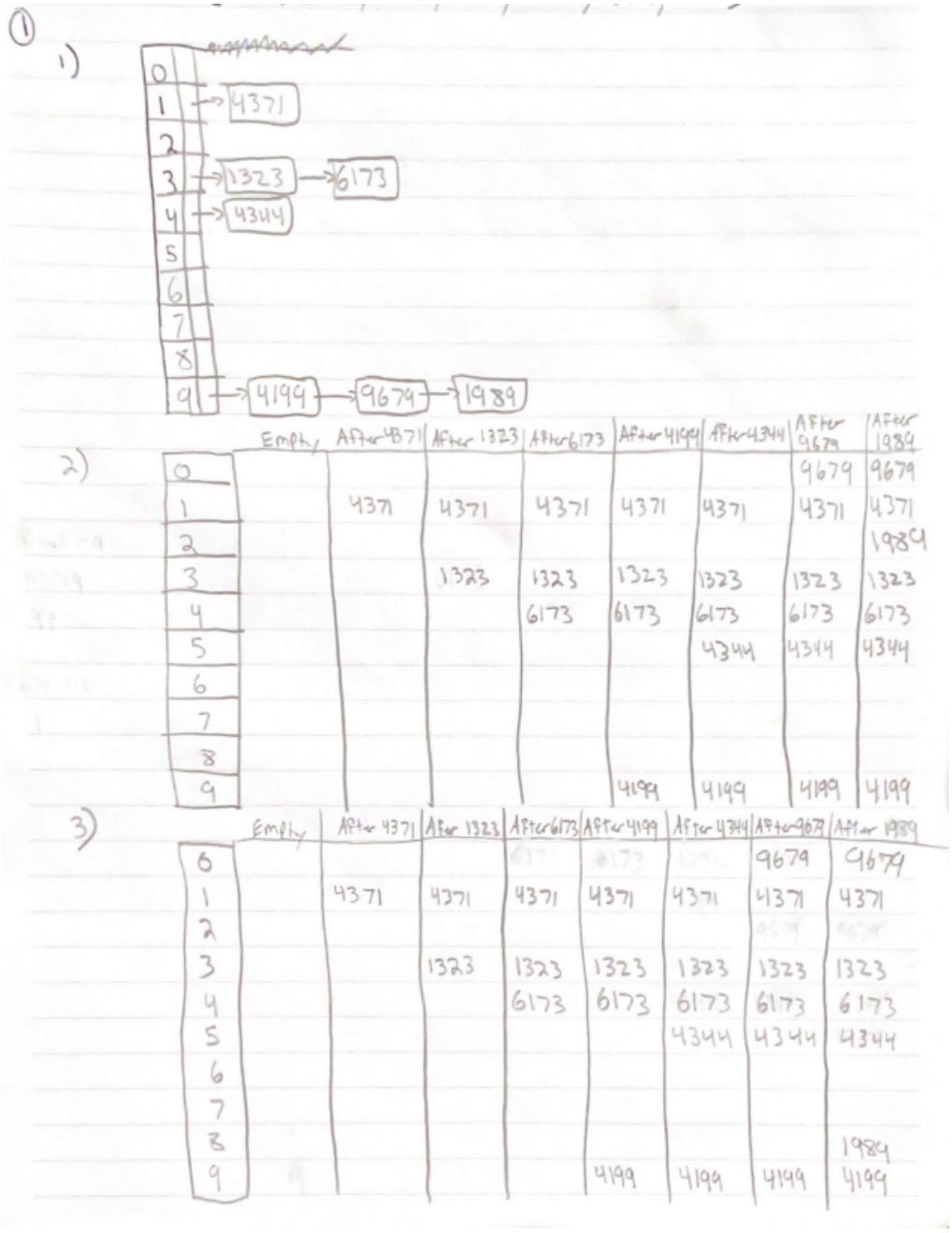
Problem 1 (6 points)

Given input {4371, 1323, 6173, 4199, 4344, 9679, 1989} and a hash function $h(x) = x \bmod 10$ (i.e., the size of the hash table m = 10), show the resulting hash tables using

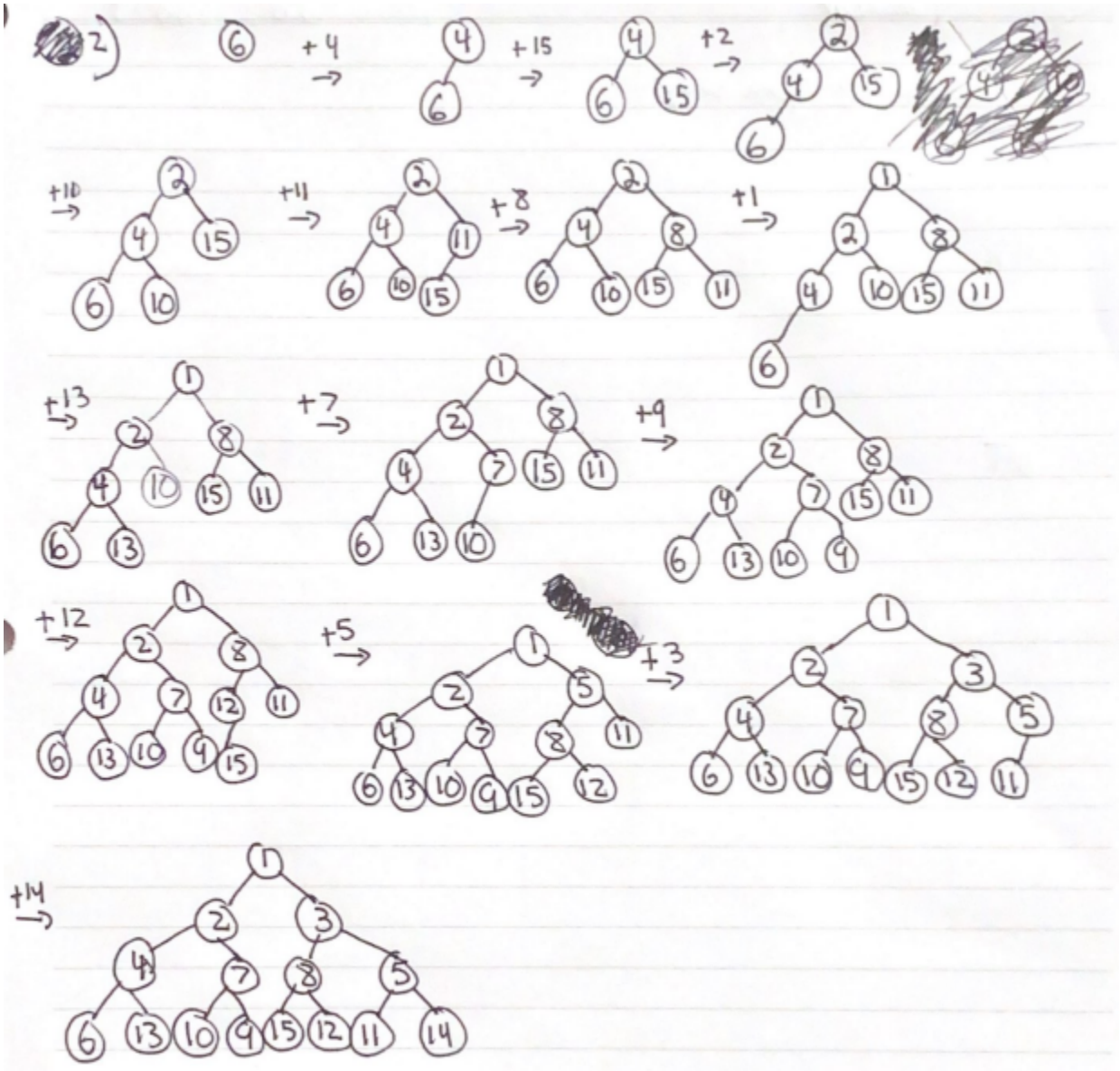
(1) Separate chaining

(2) Linear probing with $f(i) = i$

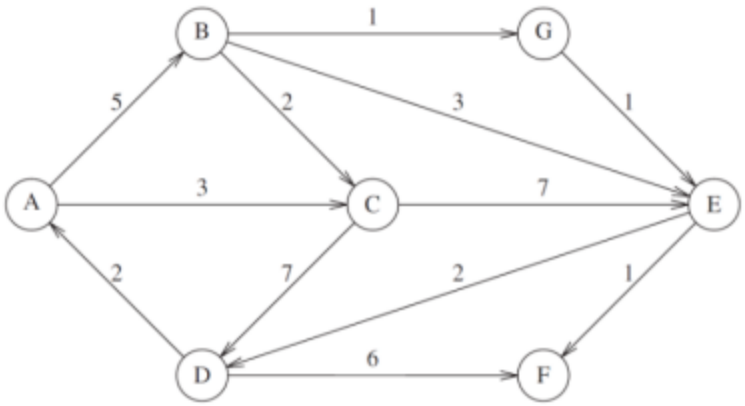
(3) Quadratic probing with $f(i) = i^2$



Problem 2 (2 points)
Show the result of inserting values 6, 4, 15, 2, 10, 11, 8, 1, 13, 7, 9, 12, 5, 3, 14 one at a time, into an initially empty binary min-heap.



Problem 3 (12 points)
Using dijkstra's algorithm to find the shortest path from B to all other vertices.



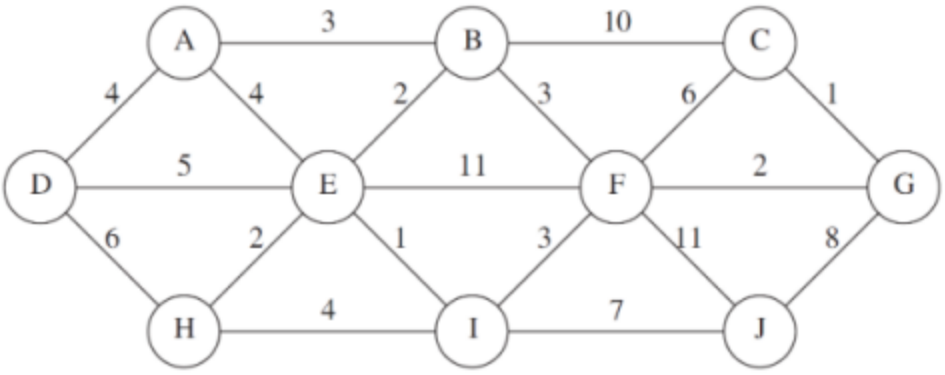
B→A: B→G→E→D→A : 6
B→C: B→C : 2
B→D: B→G→E→D : 4
B→E: B→G→E : 2
B→F: B→G→E→F: 3
B→G: B→G: 1

Problem 4 (5 points)

(1) Find a minimum spanning tree for the graph using Prim's algorithm

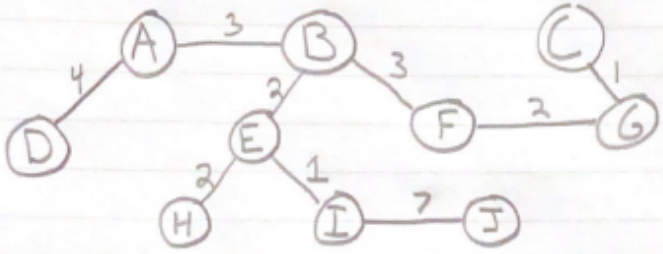
(2) Find a minimum spanning tree for the graph using Kruskal's algorithm

(3) Is this minimum spanning tree unique?



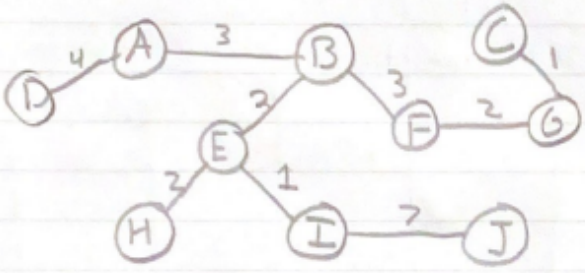
4)

1)



Cost = 25

2)



Cost 25

3) tree is not unique, as the edges are not distinct