Programming & Data Structures
Week 10 Assignment

Question 1)
Given the following sequence of numbers add to a hash table with 8 entries, and a hash function of h(x) = x % 8, show the contents of the hash using:

a) Chaining
b) Linear probing
c) Quadratic probing (c1 = ½, c2 = ½)
d) Double hashing (with h2(x) = 7 - x % 7).

Sequence: 17, 23, 100, 50, 61, 9, 12, 15, 6, 4, 33, 27, 51

a) Chaining

	17	50	27	100	61	6	23
	9		51	12			15
	33			4			

b) Linear Probing

15	17	50	9	100	61	12	23

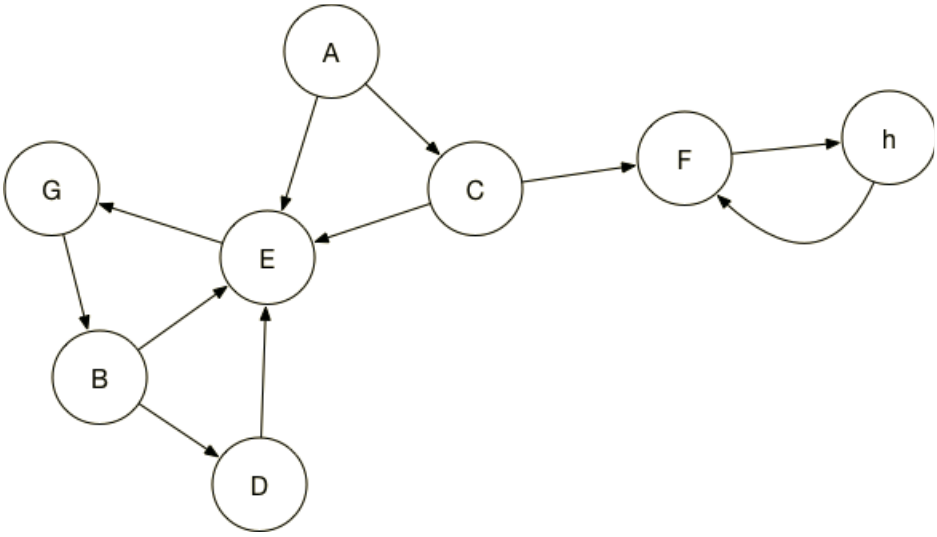
c) Quadratic Probing (c_1 = ½, c_2 = ½)

15	17	50	12	100	61	9	23

d) Double Hashing ($h_2(x) = 7 – (x \% 7)$).

12	17	50	15	100	61	9	23

Question 2)
Use the graph below to answer the following questions:



a) Depict the adjacency matrix for the graph above.

	A	B	C	D	E	F	G	H
A	0	0	1	0	1	0	0	0
B	0	0	0	1	1	0	0	0
C	0	0	0	0	1	1	0	0
D	0	0	0	0	1	0	0	0
E	0	0	0	0	0	0	1	0
F	0	0	0	0	0	0	0	1
G	0	1	0	0	0	0	0	0
H	0	0	0	0	0	1	0	0

b) Depict the adjacency list for the graph above.

A → E → C
B → E → D
C → E → F
D → E
E → G
F → H
G → B
H → F

c) How many connected components are there in the graph?

It does not make sense to talk about a directed graph being connected or not connected because there may be a path from node "i" to node "j" in a directed graph where there is no reciprocal path from node "j" to node "i".

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d) Run a DFS from B and state the sequence of nodes.

B, D, E, G

e) Run a BFS from E and state the sequence of nodes.

E, G, B, D

f) Are there cycles in the above graph? Identify all that you can find.

There are 3 cycles.
F, H
E, G, B
E, G, B, D