HW1

▼ 1. (9 points) Assume you have an empty stack, a sequence of operations are performed on it as shown below. Show all intermediate steps and the final stack.

- **push(a), pop(), push(b), push(c), pop, push(d), pop, push(e), pop**

Solution:

Operation	Stack
push(a)	a
pop()	-
push(b)	b
push(c)	b,c
pop()	b
push(d)	b,d
pop()	b
push(e)	b,e
pop()	b

Final Stack: `b`

▼ 2. (8 points) Assume you have an empty queue, a sequence of operations are performed on it as shown below. Show all intermediate steps and the final queue.

- **enqueue(a), enqueue(b), dequeue, enqueue(c), enqueue(d), enqueue(e), dequeue, dequeue**

Solution:

Operation	Queue
enqueue(a)	a
enqueue(b)	a,b
dequeue()	b
enqueue(c)	b,c
enqueue(d)	b,c,d
enqueue(e)	b,c,d,e
dequeue()	c,d,e
dequeue()	d,e

Final Queue: `d,e`

▼ 3. For the graphs in Figures-1 and 2,

▼ (a) (4 X 7 = 28 points) Write the adjacency matrix and the adjacency lists for both graphs.

- Adjacency Matrix for Figure 1:

	a	b	c	d	e
a	0	0	1	1	0
b	0	0	1	0	1
c	1	1	0	1	1
d	1	0	1	0	0
e	0	1	1	0	0

- Adjacency List for Figure 1:

a	c	d		
b	c	e		
c	a	b	d	e
d	a	c		
e	b	c		

- Adjacency Matrix for Figure 2:

	a	b	c	d	e
a	0	∞	3	2	∞
b	∞	0	1	∞	7
c	∞	∞	0	5	4
d	∞	∞	∞	0	∞
e	∞	∞	∞	∞	0

- Adjacency List for Figure 2:

a	c,3	d,2
b	c,1	e,7
c	d,5	e,4
d		
e		

▼ (b) (5 points) Are there any cycles in each graph? If so, write down the corresponding paths.

- Cycles in Figure 1:
  - a-c-d-a
  - b-c-e-b
- No Cycles in Figure 2