



# United International University (UIU)

## Dept. of Computer Science & Engineering (CSE)

Midterm Assessment Fall 2020

Course Code: CSE 2215 Course Title: Data Structures and Algorithm I

Total Marks: 20

Duration: 1 hour

**Any examinee found adopting unfair means will be expelled from the trimester/program as per UIU disciplinary rules.**

***There are THREE Questions. Answer all of them.***

1. a) Find out the run time complexity of the following algorithm. Clearly show the complexity of the necessary individual statements. [3]

```
1. sum = 0;
2. for( i=0; i<n; i=i+2 )
3. {
4.     for( j=1; j<n; j=j*2 )
5.     {
6.         sum++;
7.     }
8. }
```

1. b) Sort the following array (see the row with your student ID in the DataSheet) by quick sort algorithm, always choosing the pivot element to be the first element of the array. You have to show every step of the algorithm. [4]

2. a) Draw a diagram for each of the statements given below. You need to draw a picture for each of the instructions that has a line number at their left. [4]

```
1. struct Node
   {
       int data ;
       struct Node *next ;
       struct Node *prev ;
   };
2. Node *A, *B, *C, *D;
3. A = (Node*) malloc(sizeof(Node)) ;
4. B = (Node*) malloc(sizeof(Node)) ;
5. C = (Node*) malloc(sizeof(Node)) ;
6. A->data = 5;
7. B->data = 10;
8. C->data = 15;
9. A->next = B;
10. A->next->next = C;
11. C->prev = A;
12. C->next = B;
13. D = (Node*) malloc(sizeof(Node)) ;
14. D->data = 20;
15. B->next->next = D;
16. D->prev = B->next;
17. D->next = NULL;
18. C->next->prev = C->prev;
19. C->prev->next = C;
20. free(B);
```

2. b) Suppose there is a singly linked list node declared as below, where you only have the head pointer which points to the first node of the singly linked list: [3]

```
struct Node {  
    int data;  
    struct Node * next;  
}
```

Now write the function Sorted\_Insert(head\*, int a), that insert elements in the linked list in sorted order.

For example,

**Initial Linked list : 1-> 2-> 4->7->Null**

**Sorted\_insert(head\*, 3)**

**Updated linked list: 1->2-> 3 ->4->7->Null**

**Sorted\_insert(head\*, 6)**

**Updated linked list: 1->2-> 3 ->4->6->7->Null**

**Sorted\_insert(head\*, 10)**

**Updated linked list: 1->2-> 3 ->4->6->7->10->Null**

3. a) Suppose you have the following stack. You can see that the stack is sorted. The item with the greatest value is at the top, the item with the second greatest value is just below it, and so on. You want to add 12 to stack without compromising the sorted order. What would your approach be to this problem? You can use push(), pop(), top() and is\_empty() functions only. You can **not** directly access the stack memory, although you may use an additional queue or an additional stack if you need. You do not need to write the code. Just explain your idea in 3 to 4 lines. [2]

52
37
23
17
10
2

3. b) Suppose a Stack is implemented by using an array and a Queue is implemented by using another array. Now consider the following definitions containing push, pop and peek\_stack function of stack, and enqueue, dequeue and peek\_queue function of queue. Assume that the size of both the stack and the queue is 4. [4]

push(x) → inserts value x into stack  
pop() → deletes and returns value from stack  
peek\_stack() → returns the value at the top of stack  
enqueue(x) → inserts value x into queue  
dequeue() → deletes and returns value from queue  
peek\_queue() → returns the value at the front of the queue

You have to draw what happens after performing each of the following operations. Clearly show the value of the top of the stack, and front and rear of the queue in each step. Also show the elements in the stack and queue after performing all the operations sequentially: (see the row with your student ID in the DataSheet)

## SECTION A DATA SHEET

Student ID	Data 1.b)	Data 3.b)
011161087	15, 7, 47, 6, 50, 61, 79	push(21), enqueue(56), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011161117	12, 4, 55, 24, 28, 64, 55	push(75), enqueue(56), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011161188	37, 97, 62, 79, 37, 34, 7	push(54), enqueue(21), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011171076	95, 9, 11, 51, 59, 53, 60	push(41), enqueue(49), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011172113	63, 71, 20, 82, 86, 11, 11	push(60), enqueue(72), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011173023	4, 44, 87, 99, 33, 35, 7	push(88), enqueue(43), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011173058	19, 56, 39, 83, 79, 35, 49	push(64), enqueue(86), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011173083	58, 36, 20, 100, 58, 34, 73	push(38), enqueue(16), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011181127	48, 62, 100, 64, 60, 76, 2	push(46), enqueue(24), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011181134	30, 7, 34, 4, 29, 27, 84	push(14), enqueue(72), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011181199	100, 68, 52, 68, 75, 92, 19	push(14), enqueue(92), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011181270	75, 28, 88, 92, 62, 27, 89	push(83), enqueue(75), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011181291	77, 54, 92, 35, 61, 36, 97	push(5), enqueue(81), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011182001	40, 55, 57, 20, 59, 41, 99	push(96), enqueue(36), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011182019	40, 95, 73, 3, 90, 25, 66	push(73), enqueue(47), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()

Student ID	Data 1.b)	Data 3.b)
011182023	26, 80, 100, 48, 96, 32, 77	push(43), enqueue(96), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011182025	63, 5, 47, 88, 32, 18, 1	push(35), enqueue(85), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011182038	32, 27, 53, 63, 41, 31, 18	push(87), enqueue(59), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011182064	6, 88, 80, 59, 30, 75, 72	push(84), enqueue(3), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011183001	25, 68, 75, 100, 71, 96, 59	push(42), enqueue(31), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011183007	42, 70, 62, 55, 9, 89, 6	push(47), enqueue(62), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011183024	18, 89, 71, 65, 54, 50, 9	push(71), enqueue(85), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191002	78, 85, 7, 10, 9, 1, 94	push(83), enqueue(20), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011191033	4, 71, 95, 73, 4, 75, 12	push(50), enqueue(8), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011191038	63, 66, 44, 65, 25, 57, 24	push(14), enqueue(36), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011191039	22, 29, 36, 12, 22, 3, 55	push(21), enqueue(96), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011191042	52, 12, 51, 2, 2, 64, 73	push(74), enqueue(26), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191075	92, 61, 59, 63, 70, 40, 31	push(19), enqueue(79), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191121	68, 89, 92, 38, 82, 84, 57	push(31), enqueue(51), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()

Student ID	Data 1.b)	Data 3.b)
011191124	67, 57, 98, 18, 67, 35, 39	push(9), enqueue(75), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011191142	23, 2, 40, 8, 68, 69, 64	push(90), enqueue(31), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191148	22, 37, 82, 87, 77, 86, 24	push(24), enqueue(86), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191150	100, 35, 98, 71, 69, 34, 47	push(6), enqueue(98), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191158	15, 16, 2, 56, 18, 83, 28	push(71), enqueue(41), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191194	33, 40, 85, 69, 78, 42, 88	push(92), enqueue(37), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011191199	10, 42, 41, 75, 64, 77, 97	push(98), enqueue(67), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191201	56, 44, 67, 9, 3, 37, 86	push(57), enqueue(41), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191205	31, 71, 38, 34, 65, 44, 10	push(37), enqueue(60), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191206	24, 47, 99, 12, 32, 95, 2	push(58), enqueue(97), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191207	82, 61, 31, 96, 51, 79, 71	push(86), enqueue(84), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011191210	4, 68, 55, 14, 31, 56, 17	push(18), enqueue(4), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011191214	75, 14, 98, 85, 66, 54, 98	push(22), enqueue(83), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011191222	55, 39, 7, 56, 34, 82, 17	push(12), enqueue(67), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191234	23, 25, 19, 56, 63, 37, 12	push(25), enqueue(95), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()

Student ID	Data 1.b)	Data 3.b)
011191237	18, 28, 47, 92, 3, 15, 9	push(10), enqueue(80), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011191245	89, 59, 40, 87, 26, 25, 37	push(21), enqueue(63), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011191258	1, 16, 18, 23, 30, 60, 11	push(75), enqueue(78), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191260	75, 51, 4, 72, 99, 77, 66	push(21), enqueue(2), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011192023	94, 97, 26, 39, 75, 62, 36	push(8), enqueue(42), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011192048	59, 4, 22, 31, 23, 27, 82	push(13), enqueue(54), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011192105	8, 96, 34, 69, 98, 16, 99	push(30), enqueue(40), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011192107	69, 56, 50, 49, 4, 18, 68	push(66), enqueue(62), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011192110	68, 69, 84, 70, 44, 30, 24	push(67), enqueue(85), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011192112	17, 54, 39, 56, 59, 75, 40	push(40), enqueue(41), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011192115	18, 37, 88, 69, 52, 51, 90	push(87), enqueue(51), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011192126	5, 86, 42, 43, 90, 22, 77	push(23), enqueue(29), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011192149	28, 91, 54, 53, 15, 46, 52	push(94), enqueue(19), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011193076	1, 34, 31, 20, 20, 85, 47	push(89), enqueue(14), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()

## SECTION B DATA SHEET

Student ID	Data 1.b)	Data 3.b)
011161186	51, 77, 84, 81, 91, 7, 24	push(44), enqueue(23), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011162003	75, 19, 94, 23, 22, 28, 31	push(54), enqueue(43), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011162123	57, 45, 68, 53, 4, 100, 3	push(52), enqueue(9), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011163041	100, 46, 22, 29, 30, 4, 53	push(31), enqueue(30), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011171282	8, 8, 79, 92, 71, 83, 35	push(95), enqueue(80), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011171296	97, 24, 2, 70, 56, 52, 87	push(31), enqueue(15), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011172106	38, 16, 38, 3, 4, 57, 89	push(61), enqueue(47), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011181012	32, 9, 19, 47, 61, 5, 84	push(86), enqueue(91), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011181014	88, 87, 52, 25, 45, 87, 23	push(28), enqueue(34), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011181018	38, 17, 9, 62, 64, 37, 85	push(96), enqueue(64), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011181046	67, 17, 34, 63, 98, 58, 29	push(90), enqueue(51), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011181071	77, 14, 62, 12, 33, 78, 22	push(36), enqueue(54), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011181072	26, 46, 72, 27, 78, 21, 35	push(98), enqueue(56), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()



Student ID	Data 1.b)	Data 3.b)
011181075	38, 73, 37, 93, 61, 50, 33	push(62), enqueue(100), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011181078	46, 37, 99, 72, 92, 86, 84	push(46), enqueue(59), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011181101	57, 53, 62, 7, 13, 57, 11	push(50), enqueue(59), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011181104	11, 56, 46, 45, 93, 90, 35	push(42), enqueue(34), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011181210	54, 38, 59, 14, 100, 58, 68	push(5), enqueue(80), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011181264	93, 62, 13, 46, 10, 20, 96	push(72), enqueue(44), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011182007	53, 60, 30, 85, 93, 96, 61	push(72), enqueue(33), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011182058	98, 83, 100, 72, 62, 49, 37	push(52), enqueue(85), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011182104	44, 22, 15, 100, 67, 43, 23	push(27), enqueue(80), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011182133	29, 71, 28, 17, 40, 60, 91	push(14), enqueue(82), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011183036	86, 88, 20, 71, 66, 10, 69	push(61), enqueue(76), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011183050	76, 70, 28, 94, 2, 69, 15	push(53), enqueue(86), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011183054	41, 70, 5, 14, 9, 31, 52	push(55), enqueue(52), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011183055	23, 65, 40, 55, 33, 18, 30	push(30), enqueue(83), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011183062	58, 25, 63, 11, 42, 30, 80	push(81), enqueue(45), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()

Student ID	Data 1.b)	Data 3.b)
011183067	12, 73, 55, 16, 98, 41, 36	push(27), enqueue(14), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011183090	82, 95, 3, 76, 33, 50, 16	push(62), enqueue(96), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011183091	32, 67, 41, 78, 72, 96, 93	push(13), enqueue(18), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011183094	28, 71, 48, 26, 67, 9, 91	push(17), enqueue(98), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011191009	67, 3, 59, 61, 85, 45, 4	push(1), enqueue(59), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191022	39, 54, 10, 7, 99, 25, 19	push(10), enqueue(39), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191103	62, 26, 72, 85, 55, 28, 83	push(93), enqueue(99), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191146	35, 38, 85, 21, 60, 98, 45	push(20), enqueue(52), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011191189	28, 23, 74, 32, 90, 67, 57	push(26), enqueue(90), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011191195	6, 79, 49, 38, 98, 30, 95	push(76), enqueue(2), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191200	99, 86, 74, 95, 11, 31, 75	push(68), enqueue(58), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011191268	54, 11, 50, 4, 35, 55, 38	push(32), enqueue(33), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011192003	95, 55, 9, 25, 32, 75, 32	push(3), enqueue(51), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011192006	39, 74, 17, 37, 71, 55, 90	push(41), enqueue(38), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011192010	53, 49, 24, 47, 82, 46, 91	push(60), enqueue(69), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()

Student ID	Data 1.b)	Data 3.b)
011192043	41, 27, 96, 9, 7, 40, 4	push(91), enqueue(95), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011192069	13, 45, 58, 24, 23, 53, 57	push(70), enqueue(17), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011192071	17, 75, 69, 81, 29, 83, 27	push(46), enqueue(97), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011192075	52, 39, 68, 95, 26, 44, 98	push(53), enqueue(32), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011192095	17, 27, 29, 83, 7, 89, 55	push(70), enqueue(12), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011192118	45, 57, 41, 61, 83, 53, 51	push(59), enqueue(52), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011193024	75, 39, 10, 38, 71, 43, 34	push(72), enqueue(63), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011193064	95, 62, 33, 81, 74, 60, 3	push(99), enqueue(48), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011193149	63, 96, 16, 52, 91, 60, 36	push(25), enqueue(99), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011203025	53, 28, 44, 32, 45, 35, 25	push(62), enqueue(28), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()

## SECTION C DATA SHEET

Student ID	Data 1.b)	Data 3.b)
011143014	84, 23, 57, 37, 19, 35, 30	push(33), enqueue(75), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011161274	76, 61, 19, 51, 34, 62, 12	push(29), enqueue(93), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011162057	30, 69, 97, 71, 26, 46, 67	push(62), enqueue(87), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011171019	22, 52, 10, 19, 62, 13, 53	push(83), enqueue(1), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011171069	16, 88, 6, 71, 95, 44, 25	push(65), enqueue(12), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011171230	45, 1, 46, 9, 55, 93, 56	push(66), enqueue(44), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011171242	51, 83, 28, 90, 32, 90, 4	push(4), enqueue(16), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011173011	68, 42, 12, 10, 32, 55, 88	push(5), enqueue(46), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011173047	15, 22, 67, 78, 50, 21, 94	push(64), enqueue(73), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011181058	50, 6, 72, 82, 59, 38, 39	push(17), enqueue(45), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011181116	73, 47, 16, 59, 58, 76, 82	push(74), enqueue(100), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011181133	11, 41, 1, 77, 30, 58, 55	push(61), enqueue(50), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011181175	89, 17, 47, 8, 50, 86, 11	push(64), enqueue(23), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011181293	62, 51, 58, 45, 88, 34, 81	push(79), enqueue(15), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011182027	98, 4, 50, 68, 51, 2, 9	push(99), enqueue(32), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()

Student ID	Data 1.b)	Data 3.b)
011182126	75, 63, 21, 31, 67, 19, 33	push(9), enqueue(54), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011182137	92, 68, 32, 90, 23, 53, 64	push(68), enqueue(76), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011183005	82, 44, 10, 23, 49, 16, 10	push(58), enqueue(33), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011183027	27, 47, 23, 38, 34, 29, 86	push(5), enqueue(94), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011183028	6, 14, 81, 26, 64, 85, 93	push(45), enqueue(83), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011183029	100, 82, 73, 65, 90, 87, 66	push(15), enqueue(25), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011183058	92, 72, 5, 21, 47, 43, 53	push(73), enqueue(21), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191003	38, 40, 31, 73, 61, 29, 90	push(61), enqueue(2), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011191007	92, 67, 74, 26, 63, 80, 14	push(35), enqueue(7), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191010	47, 88, 61, 48, 58, 52, 31	push(23), enqueue(27), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191014	82, 55, 81, 28, 14, 48, 67	push(51), enqueue(3), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191024	5, 89, 13, 45, 38, 46, 72	push(77), enqueue(68), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191028	48, 77, 64, 82, 39, 77, 30	push(62), enqueue(47), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191036	5, 81, 56, 26, 78, 41, 75	push(54), enqueue(12), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191053	45, 45, 47, 73, 42, 46, 55	push(25), enqueue(46), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()

Student ID	Data 1.b)	Data 3.b)
011191060	99, 43, 71, 58, 13, 56, 67	push(44), enqueue(67), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191065	63, 56, 91, 49, 43, 13, 4	push(76), enqueue(47), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191086	60, 17, 28, 25, 89, 86, 79	push(19), enqueue(97), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011191106	17, 33, 69, 75, 83, 69, 86	push(93), enqueue(56), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()
011191122	92, 31, 95, 2, 19, 97, 17	push(58), enqueue(70), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011191137	51, 15, 81, 18, 12, 31, 85	push(91), enqueue(96), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011191140	23, 86, 65, 98, 18, 31, 62	push(46), enqueue(88), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011191161	41, 46, 38, 64, 8, 63, 89	push(62), enqueue(72), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011191249	80, 46, 28, 93, 47, 78, 84	push(63), enqueue(22), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011191254	66, 41, 71, 54, 32, 85, 31	push(53), enqueue(92), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011191255	75, 8, 76, 55, 75, 99, 32	push(99), enqueue(58), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011192017	79, 53, 68, 54, 11, 82, 11	push(78), enqueue(50), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011192066	53, 1, 73, 83, 70, 7, 91	push(28), enqueue(55), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011192070	25, 78, 38, 59, 65, 46, 1	push(93), enqueue(73), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), dequeue()
011192072	41, 100, 54, 67, 72, 41, 94	push(25), enqueue(15), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()

Student ID	Data 1.b)	Data 3.b)
011192077	29, 17, 64, 32, 93, 37, 18	push(79), enqueue(44), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011192081	71, 17, 33, 15, 77, 91, 5	push(31), enqueue(97), enqueue(peek_stack()), push(peek_queue()), enqueue(pop()), push(dequeue()), pop()
011192082	33, 62, 3, 35, 49, 27, 18	push(64), enqueue(89), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), pop()
011192086	45, 27, 34, 22, 39, 82, 30	push(45), enqueue(52), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011192101	9, 44, 61, 8, 28, 81, 94	push(57), enqueue(38), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011193011	46, 34, 55, 58, 89, 47, 4	push(18), enqueue(62), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011193018	78, 80, 75, 4, 20, 54, 4	push(21), enqueue(29), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), pop()
011193023	73, 28, 82, 5, 48, 9, 39	push(4), enqueue(66), enqueue(peek_stack()), push(peek_queue()), push(dequeue()), enqueue(pop()), dequeue()
011193080	33, 21, 45, 54, 78, 61, 15	push(71), enqueue(98), push(peek_queue()), enqueue(peek_stack()), enqueue(pop()), push(dequeue()), dequeue()
011193134	66, 47, 20, 68, 27, 96, 69	push(56), enqueue(33), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), dequeue()
011193135	31, 13, 32, 87, 77, 71, 14	push(36), enqueue(77), push(peek_queue()), enqueue(peek_stack()), push(dequeue()), enqueue(pop()), pop()