

CME227 DATA STRUCTURES
Single Course Exam, June, 26, 2020

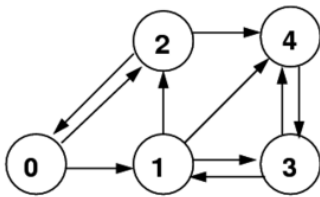
Number/Name/:..... **Duration: 70 mins.**

1-) (15 pts.) Construct an AVL tree by inserting the following key values in the given order into an empty AVL tree. Draw each tree after each insertion separately. In the final AVL tree, perform postorder traversal. (Aşağıdaki değerleri sırasıyla boş bir AVL ağacına eklersek AVL ağacının her adımını çizin. Son ağaçta ise postorder işlemi uygulayınız.

50, 25, 10, 5, 7, 62, 55, 20

2-) (20 pts.) Write a function that converts a given min heap which is implemented by arrays to a max heap. The prototype of the function is `queue *convert(queue *q)`. Dizi ile implemente edilmiş bir min heap i max heap e dönüştürünüz.

3-) (15 pts.) Construct the adjacency list and adjacency matrix representation of the following directed graph. Aşağıdaki yönlü grafin komşuluk listesi ve komşuluk matrisi gösterimlerini yazınız.



4-) (20 pts.) Write a function if a given double linked list of characters (each node has just one character as data) is palindrome or not? Karakterlerden oluşan (her düğümün datası tek bir karakter) çift bağlı bir listenin palindrome olup olmadığını tespit eden bir fonksiyon yazın.

- 1) A binary search tree whose left subtree and right subtree differ in height by at most 1 is called
 - A) AVL
 - B) Graph
 - C) Heap
 - D) None of the above
- 2) A binary tree in which every non-leaf node has non-empty left and right subtrees is called a strictly binary tree. Such a tree with 10 leaves
 - A) Cannot have more than 19 nodes
 - B) Has exactly 19 nodes
 - C) Has exactly 17 nodes
 - D) Cannot have more than 17 nodes
- 3) When inorder traversing a tree resulted E A C K F H D B G; the preorder traversal would return
 - A) FAEKCDHBG
 - B) FAEKCDHGB
 - C) EAFKHDCBG
 - D) FEAKDCHBG
- 4) For an undirected graph with n vertices and e edges, the sum of the degree of each vertex is equal to
 - A) 2n
 - B) (2n-1)/2
 - C) 2e
 - D) e/2
- 5) The number of leaf nodes in a complete binary tree of depth d is
 - A) 2^d
 - B) $2^{d-1}+1$
 - C) $2^{d+1}+1$
 - D) $2d+1$
- 6) If G is an directed graph with 20 vertices, how many boolean values will be needed to represent G using an adjacency matrix?
 - A) 20
 - B) 40
 - C) 200
 - D) 400
- 7) Suppose t is a variable, which expression indicates that t represents an empty tree?
 - A) t = NULL
 - B) t->data = 0
 - C) t->data=NULL
 - D) t->left=NULL&& t->right=NULL
- 8) What does the following function do for a given Linked List with first node as head?

```
void fun1(struct node* head){
    if(head == NULL)
        return;
    fun1(head->next);
    printf("%d ", head->data);
}
```

- A) Prints all nodes of linked lists
- B) Prints all nodes of linked list in reverse order
- C) Prints alternate nodes of Linked List
- D) Prints alternate nodes in reverse order

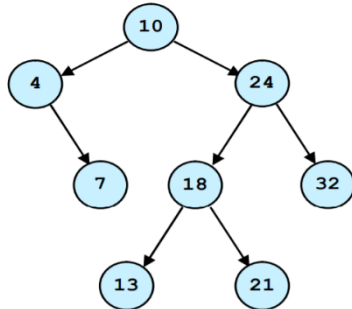
9) What is the result of the following string expression

48+6/3*44+-6*

- A) 14
- B) 6
- C) 8
- D) 12

10) What is the preorder traversal of the new tree after data 18 is deleted?

- A) 4 7 10 24 13 21 32
- B) 13 21 32 24 10 7 4
- C) 10 4 7 24 13 21 32
- D) none of them



11) Which data structure is needed to convert infix notation to postfix notation?

- A. Branch
- B. Queue
- C. Tree
- D. Stack

12-) Which of the following data structure is linear data structure?

- A. Trees
- B. Graphs
- C. Linked Lists
- D. None of above

13-) Inorder traversal of binary search tree will produce

- A. unsorted list
- B. reverse of input
- C. sorted list
- D. none of the above

14-) A queue is a,

- A. FIFO (First In First Out) list.
- B. Ordered array.
- C. LIFO (Last In First Out) list.
- D. Linear tree.

15-) Which of the following operations is performed more efficiently by doubly linked list than by singly linked list?

- A. Deleting a node whose location is given
- B. Searching of an unsorted list for a given item
- C. Inserting a new node to the front of the list
- D. Traversing the list in forward direction

16-) The postfix form of $(A + B) * (C * D - E) * F / G$ is

- A. $AB + CD * E - FG /**$
- B. $AB + CD * E - F ** G /$
- C. $AB + CD * E - * F * G /$
- D. $AB + CDE * - * F * G /$

17-) Stack works on the principle of

- A. LILO
- B. FIFO
- C. ZORO
- D. LIFO

18-) Under which condition circular queue is Full if cnt is not used

- A. $Front = -1$
- B. $Front = (rear + 1) \% maxsize$
- C. $Front = (front + 1) \% maxsize$
- D. $Rear = (rear + 1) \% maxsize$

19-) What is the output of the following code?

```

int values[5] = {5, 3, 8, 7, 11};
stack s;
initialize(&s);
for (int i = 0; i < 5; i++)
    push (&s, values[i]);
int n = 20;
for (int i = 0; i < 3; i++)
    n += pop(&s);
for (int i = 0; i < 2; i++)
    n -= pop(&s);
printf("%d", n);
  
```

- A. 38
- B. 29
- C. 53
- D. None of these

20-) A full binary tree with n leaves contains

- A. n^2 nodes.
- B. $\lg n$ nodes.
- C. $2n - 1$ nodes.
- D. $n \lg n$ nodes.