

1. Write a program in C to print the Minimum number of nodes in an AVL Tree with given height.

```
// Function to find
// minimum number of nodes
int AVLnodes(int height)
{
    // Base Conditions
    if (height == 0)
        return 1;
    else if (height == 1)
        return 2;

    // Recursive function call
    // for the recurrence relation
    return (1 + AVLnodes(height - 1) + AVLnodes(height - 2));
}

int main()
{
    int H = 3;
    printf("%d",AVLnodes(H));
}
```

2. Write a Function to Add and Remove Edge in Adjacency Matrix representation of a Graph.

```
void addEdge(int x, int y)
{
    // Checks if the vertices
    // exist in the graph
    if ((x < 0) || (x >= n)) {
        printf("Vertex %d does not exist!",x);
    }
}
```

---

```
    if ((y < 0) || (y >= n)) {
        printf("Vertex %d does not exist!",y);
    }

    // Checks if it is a self edge
    if (x == y) {
        printf( "Same Vertex!");
    }

    else {
        // Insert edge
        g[y][x] = 1;
        g[x][y] = 1;
    }
}

// Function to update adjacency
// matrix for edge removal
void removeEdge(int x, int y)
{
    // Checks if the vertices
    // exist in the graph
    if ((x < 0) || (x >= n)) {
        printf("Vertex %d does not exist!",x);
    }
    if ((y < 0) || (y >= n)) {
        printf("Vertex %d does not exist!",y);    }

    // Checks if it is a self edge
    if (x == y) {
        printf("Same Vertex!");
    }

    else {
        // Remove edge
        g[y][x] = 0;
        g[x][y] = 0;
    }
}
```

---

```
};
```

3. Program in c to check whether a cycle exists or not in a graph

```
#include <stdlib.h>
```

```
typedef struct {  
    unsigned int first;  
    unsigned int second;  
} edge;
```

```
static unsigned int cyclic_recursive(const edge *edges, unsigned int n,  
    unsigned int *visited,  
    unsigned int order, unsigned int vertex, unsigned int predecessor)  
{  
    unsigned int i;  
    unsigned int cycle_found = 0;  
    visited[vertex] = 1;  
    for (i = 0; i < n && !cycle_found; i++) {  
        if (edges[i].first == vertex || edges[i].second == vertex) {  
            /* Adjacent */  
            const unsigned int neighbour = edges[i].first == vertex ?  
                edges[i].second : edges[i].first;  
            if (visited[neighbour] == 0) {  
                /* Not yet visited */  
                cycle_found = cyclic_recursive(edges, n, visited, order, neighbour,  
vertex);  
            }  
            else if (neighbour != predecessor) {  
                /* Found a cycle */  
                cycle_found = 1;  
            }  
        }  
    }  
    return cycle_found;  
}
```

```
unsigned int cyclic(const edge *edges, unsigned int n, unsigned int order)  
{
```

---

```
unsigned int *visited = calloc(order, sizeof(unsigned int));
unsigned int cycle_found;
if (visited == NULL) {
    return 0;
}
cycle_found = cyclic_recursive(edges, n, visited, order, 0, 0);
free(visited);
return cycle_found;
}
```

4. Write a procedure to return the degree of a given node

```
int findDegree(struct graph *G, int ver)
{
    // Traverse through row of ver and count
    // all connected cells (with value 1)
    int degree = 0;
    for (int i=0; i<G->v; i++)

        // if src to des is 1 the degree count
        if (G->dir[ver][i] == 1)
            degree++;

    return degree;
}
```

5. Program to count the number of nodes in a graph

```
struct node
{
    int info;

    struct node *left, *right;
};

struct node *createnode(int key)
{
}
```

---

```
struct node *newnode = (struct node*)malloc(sizeof(struct node));  
newnode->info = key;  
newnode->left = NULL;  
newnode->right = NULL;  
return(newnode);  
}  
static int count = 0;  
int countnodes(struct node *root)  
{  
    if(root != NULL)  
    {  
        countnodes(root->left);  
        count++;  
        countnodes(root->right);  
    }  
    return count;  
}
```