EXP 5 - Compute FIRST() AND FOLLOW()

Name: - Sai Mohit Ambekar

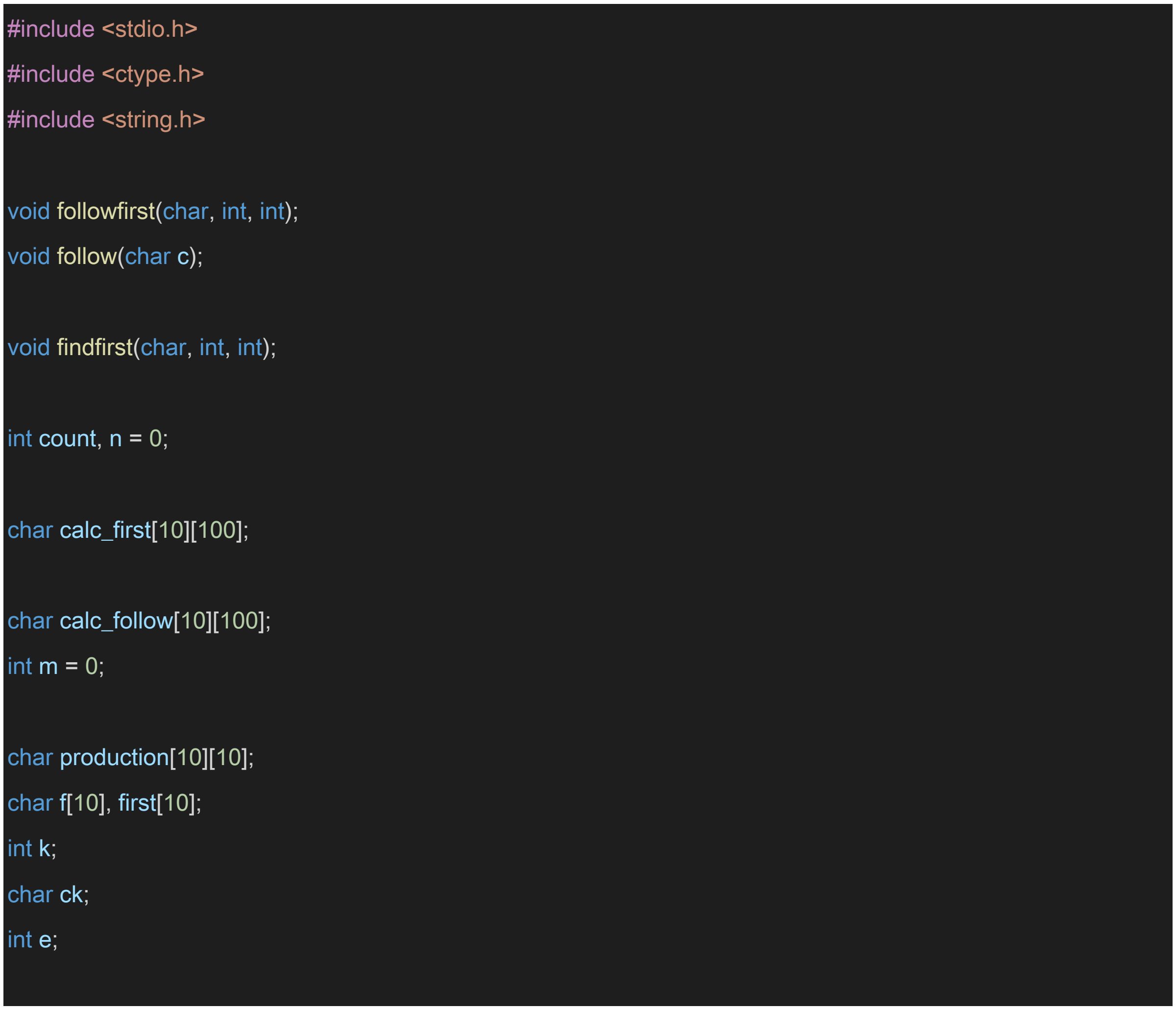
Reg No: - RA1911031010137

Class: - CSE-IT (L2 Section)

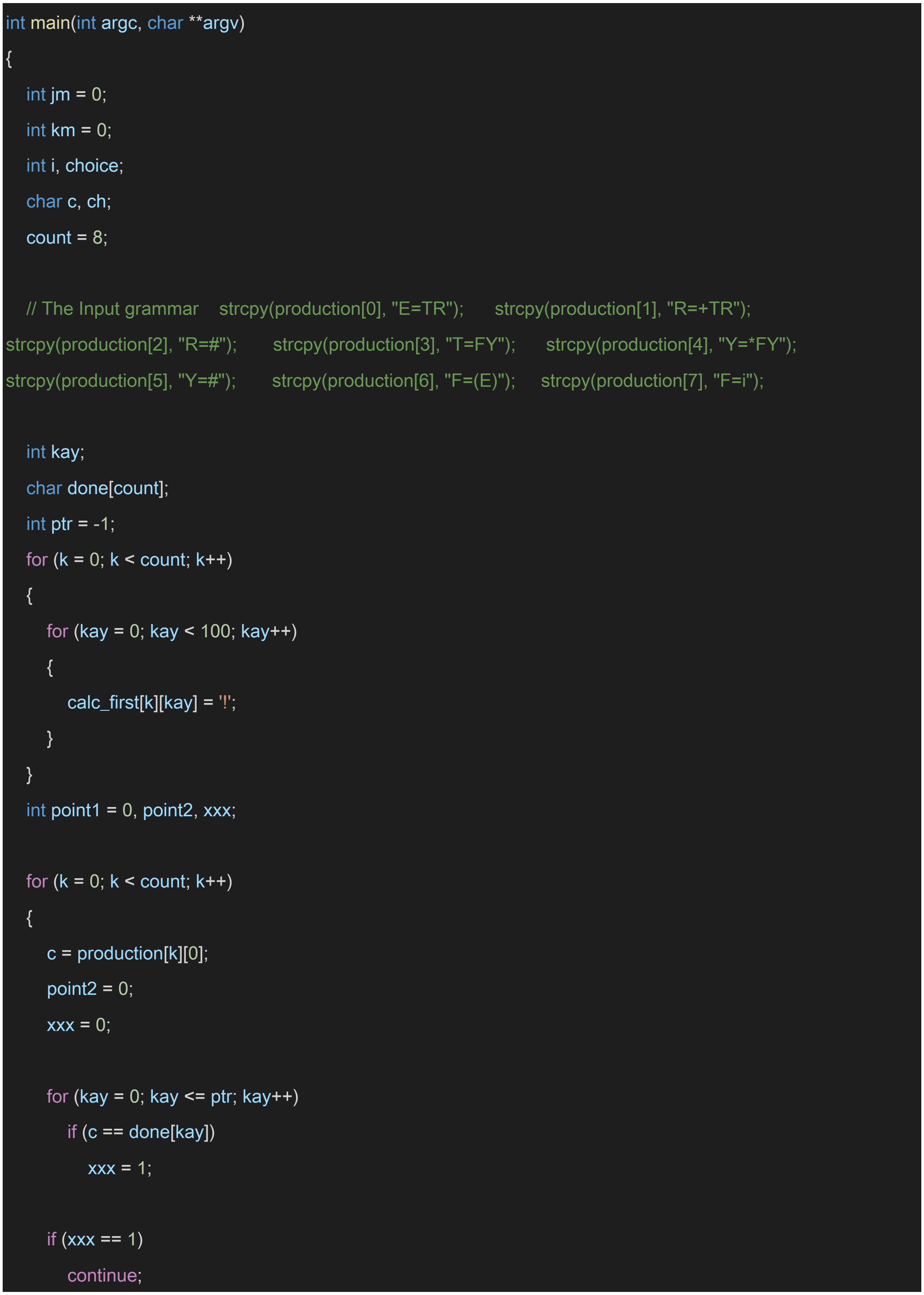
Aim:

To write a program to perform first and follow.

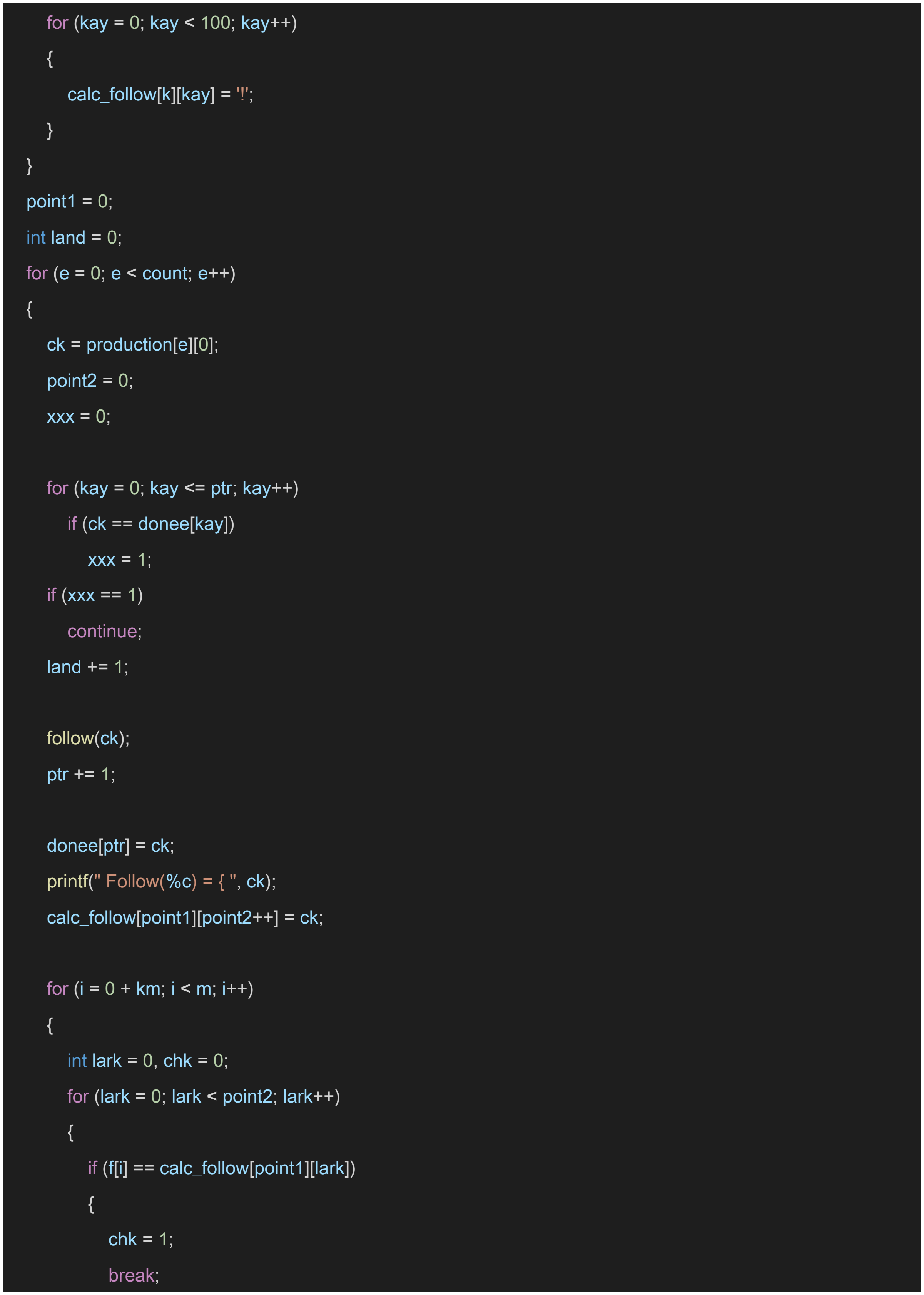
Program / Code:



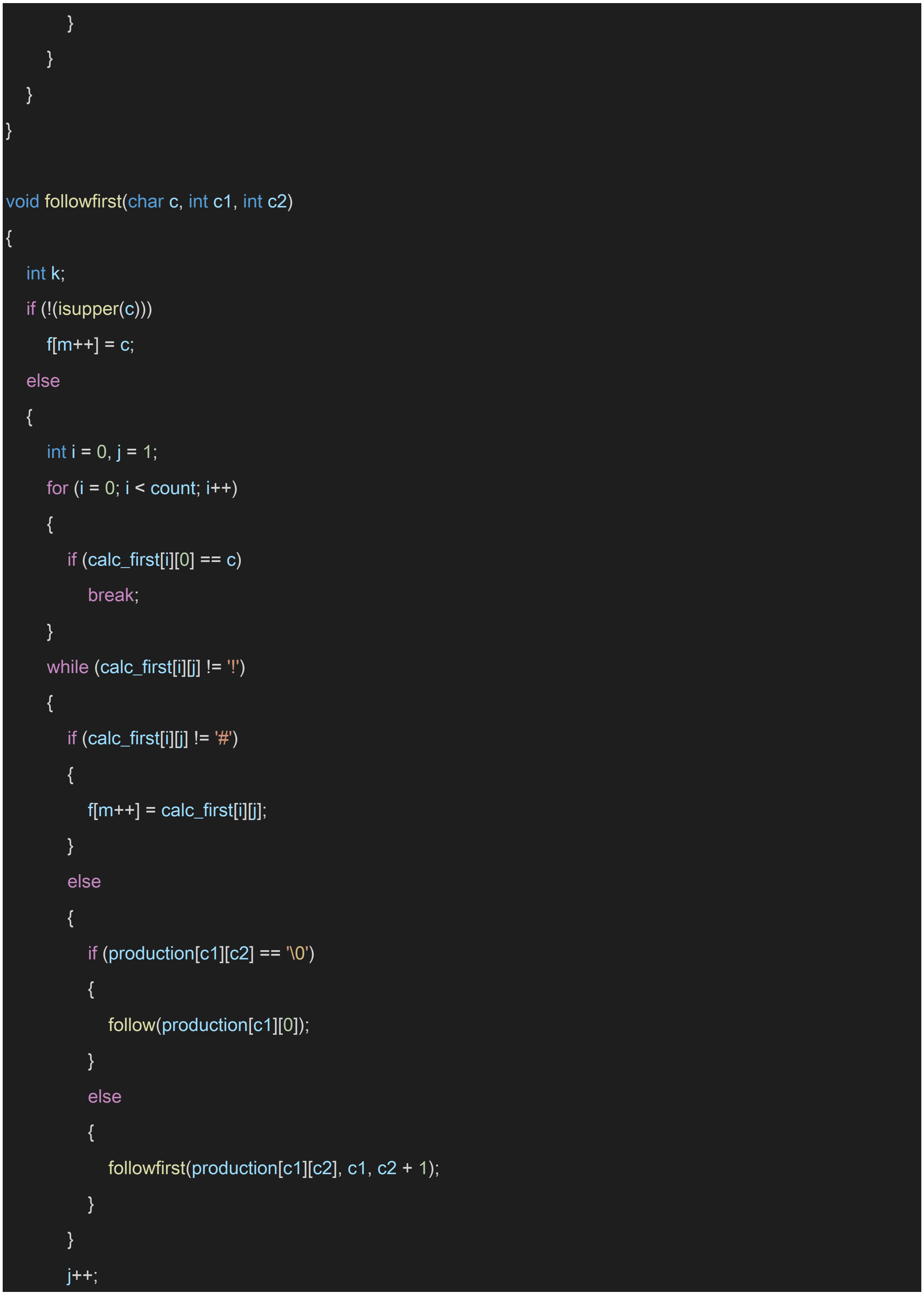
```
#include <stdio.h>
#include <ctype.h>
#include <string.h>

void followfirst(char, int, int);
void follow(char c);

void findfirst(char, int, int);

int count, n = 0;

char calc_first[10][100];

char calc_follow[10][100];
int m = 0;

char production[10][10];
char f[10], first[10];
int k;
char ck;
int e;
```



```
int main(int argc, char **argv)
{
    int jm = 0;
    int km = 0;
    int i, choice;
    char c, ch;
    count = 8;

    // The Input grammar    strcpy(production[0], "E=TR");      strcpy(production[1], "R=+TR");
strcpy(production[2], "R=#");       strcpy(production[3], "T=FY");      strcpy(production[4], "Y=*FY");
strcpy(production[5], "Y=#");       strcpy(production[6], "F=(E)");     strcpy(production[7], "F=i");

    int kay;
    char done[count];
    int ptr = -1;
    for (k = 0; k < count; k++)
    {
        for (kay = 0; kay < 100; kay++)
        {
            calc_first[k][kay] = '!';
        }
    }
    int point1 = 0, point2, xxx;

    for (k = 0; k < count; k++)
    {
        c = production[k][0];
        point2 = 0;
        xxx = 0;

        for (kay = 0; kay <= ptr; kay++)
            if (c == done[kay])
                xxx = 1;

        if (xxx == 1)
            continue;
        findfirst(c, 0, 0);
        ptr += 1;

        done[ptr] = c;
        printf("\n First(%c) = { ", c);
        calc_first[point1][point2++] = c;
        for (i = 0 + jm; i < n; i++)
        {
            int lark = 0, chk = 0;
            for (lark = 0; lark < point2; lark++)
            {

                if (first[i] == calc_first[point1][lark])
                {
                    chk = 1;
                    break;
                }
            }
            if (chk == 0)
            {
                printf("%c, ", first[i]);
                calc_first[point1][point2++] = first[i];
            }
        }
        printf("}\n");
        jm = n;
        point1++;
    }
    printf("\n");
    printf("-----------------------------------------------\n\n");
    char donee[count];
    ptr = -1;

    for (k = 0; k < count; k++)
    {
```



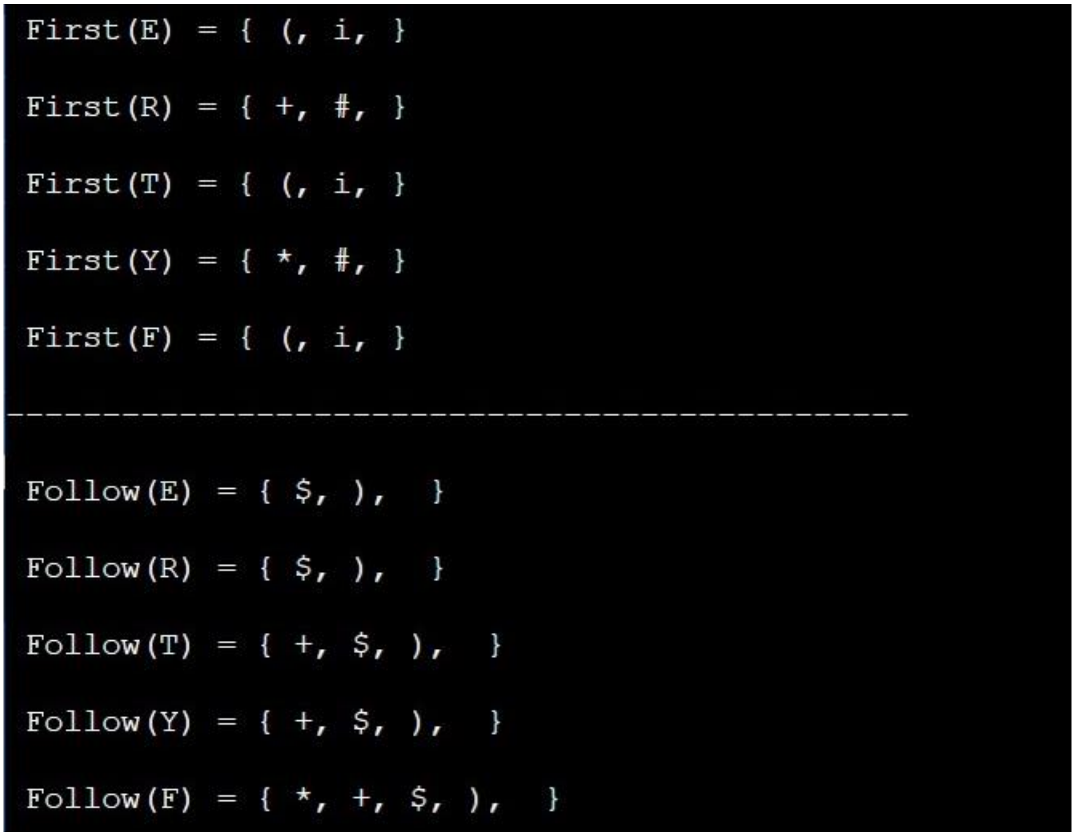
```
    for (kay = 0; kay < 100; kay++)
    {
        calc_follow[k][kay] = '!';
    }
}
point1 = 0;
int land = 0;
for (e = 0; e < count; e++)
{
    ck = production[e][0];
    point2 = 0;
    xxx = 0;

    for (kay = 0; kay <= ptr; kay++)
        if (ck == donee[kay])
            xxx = 1;
    if (xxx == 1)
        continue;
    land += 1;

    follow(ck);
    ptr += 1;

    donee[ptr] = ck;
    printf(" Follow(%c) = { ", ck);
    calc_follow[point1][point2++] = ck;

    for (i = 0 + km; i < m; i++)
    {
        int lark = 0, chk = 0;
        for (lark = 0; lark < point2; lark++)
        {
            if (f[i] == calc_follow[point1][lark])
            {
                chk = 1;
                break;
                }
            }
            if (chk == 0)
            {
                printf("%c, ", f[i]);
                calc_follow[point1][point2++] = f[i];
            }
        }
        printf(" }\n\n");
        km = m;
        point1++;
    }
}

void follow(char c)
{
    int i, j;

    if (production[0][0] == c)
    {
        f[m++] = '$';
    }
    for (i = 0; i < 10; i++)
    {
        for (j = 2; j < 10; j++)
        {
            if (production[i][j] == c)
            {
                if (production[i][j + 1] != '\0')
                {
                    followfirst(production[i][j + 1], i, (j + 2));
                }

                if (production[i][j + 1] == '\0' && c != production[i][0])
                {
                    follow(production[i][0]);
                }
            }
        }
    }
}

void findfirst(char c, int q1, int q2)
{
    int j;

    if (!(isupper(c)))
    {
        first[n++] = c;
    }
    for (j = 0; j < count; j++)
    {
        if (production[j][0] == c)
        {
            if (production[j][2] == '#')
            {
                if (production[q1][q2] == '\0')
                    first[n++] = '#';
                else if (production[q1][q2] != '\0' && (q1 != 0 || q2 != 0))
                {
                    findfirst(production[q1][q2], q1, (q2 + 1));
                }
                else
                    first[n++] = '#';
            }
            else if (!isupper(production[j][2]))
            {
                first[n++] = production[j][2];
            }
            else
            {
                findfirst(production[j][2], j, 3);
```



```c
            }
        }
    }
}

void followfirst(char c, int c1, int c2)
{
    int k;
    if (!(isupper(c)))
        f[m++] = c;
    else
    {
        int i = 0, j = 1;
        for (i = 0; i < count; i++)
        {
            if (calc_first[i][0] == c)
                break;
        }
        while (calc_first[i][j] != '!')
        {
            if (calc_first[i][j] != '#')
            {
                f[m++] = calc_first[i][j];
            }
            else
            {
                if (production[c1][c2] == '\0')
                {
                    follow(production[c1][0]);
                }
                else
                {
                    followfirst(production[c1][c2], c1, c2 + 1);
                }
            }
            j++;
```

```
      }
   }
}
```

Output:



```
First(E) = {  (, i, }

First(R) = { +, #, }

First(T) = {  (, i, }

First(Y) = { *, #, }

First(F) = {  (, i, }

-----------------------------------------------------

Follow(E) = { $, ),   }

Follow(R) = { $, ),   }

Follow(T) = { +, $, ),   }

Follow(Y) = { +, $, ),   }

Follow(F) = { *, +, $, ),   }
```

<u>Result</u>:

The FIRST and FOLLOW sets of the non-terminals of a grammar were found successfully.