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CSE D 44
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Q1. S→a | > | (T)
    T→T, S|S

Left Recursion Removed :

S → a | > | (T)
T → S T'
T' → , S T' | ε

Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
int curr = 0;
char str[100];
//
----------------------------------------------------------------------------------------------------------------
void S();
void T();
void Tprime();
//
----------------------------------------------------------------------------------------------------------------
void invalid()
{
    printf("-----------------ERROR!----------------\n");
    exit(0);
}
void valid()
{
    printf("----------------SUCCESS!--------------\n");
    exit(0);
}
//
----------------------------------------------------------------------------------------------------------------
void S()
{
  if(str[curr] == 'a'){
   curr++;
   }
  else if(str[curr] == '>'){
   curr++;
   }
  else if(str[curr] == '('){
   curr++;
   T();

   if(str[curr] == ')'){
```

```c
      curr++;
    }
    else{
      invalid();
    }
    }
    else{
    invalid();
    }
}
//
-----------------------------------------------------------------------------------------------------------
void T()
{
    S();
    Tprime();
}
//
-----------------------------------------------------------------------------------------------------------
void Tprime()
{
    if(str[curr] == ','){
      curr++;
      S();
      Tprime();
    }
}

//
-----------------------------------------------------------------------------------------------------------
int main()
{
    printf("Enter String: ");
    scanf("%s", str);
    S();
    if (str[curr] == '$')
      valid();
    else
      printf("%c\n", str[curr]);
      invalid();
}
```

Output :

Q2. *S → UVW*
    U → (S) | aSb | d
    V → aV | ε
    W → cW | ε є

Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>

int curr = 0;
char str[100];

//
----------------------------------------------------------------------------------------------------------------

void S();
void U();
void V();
void W();
void invalid();
void valid();

//
----------------------------------------------------------------------------------------------------------------

void invalid()
{
    printf("-----------------ERROR!----------------\n");
    exit(0);
}

void valid()
{
    printf("----------------SUCCESS!---------------\n");
    exit(0);
}

//
----------------------------------------------------------------------------------------------------------------

void S()
{
    U();
    V();
    W();
}

//
----------------------------------------------------------------------------------------------------------------
```

```
void U()
{
   if (str[curr] == '(')
   {
      curr++;
      S();
      if (str[curr] == ')')
      {
         curr++;
      }
      else
      {
         invalid();
      }
   }
   else if (str[curr] == 'a')
   {
      curr++;
      S();
      if (str[curr] == 'b')
      {
         curr++;
      }
      else
      {
         invalid();
      }
   }
   else if (str[curr] == 'd')
   {
      curr++;
   }
   else
   {
      invalid();
   }
}

//
-------------------------------------------------------------------------------------------------------------

void V()
{
   if (str[curr] == 'a')
   {
      curr++;
      V();
   }
}

//
-------------------------------------------------------------------------------------------------------------
```

```
void W()
{
   if (str[curr] == 'c')
   {
      curr++;
      W();
   }
}

//
-------------------------------------------------------------------------------------------------------------

int main()
{
   printf("Enter String: ");
   scanf("%s", str);
   S();
   if (str[curr] == '$')
      valid();
   else
      invalid();
}
```

Output :

Q3.S → aAcBe
A → Ab|b
B → d

Left Recursion Removed :

S → aAcBe
A → bA'
A' → bA' | ε
B → d

Code :

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

```c
int curr = 0;
char str[100];
//
----------------------------------------------------------------------------------------------------
void S();
void A();
void Aprime();
void B();
void invalid();
void valid();
//
----------------------------------------------------------------------------------------------------
void invalid()
{
    printf("-----------------ERROR!----------------\n");
    exit(0);
}

void valid()
{
    printf("----------------SUCCESS!---------------\n");
    exit(0);
}
//
----------------------------------------------------------------------------------------------------

void S()
{
    if (str[curr] == 'a')
    {
        curr++;
        A();
        if (str[curr] == 'c')
        {
            curr++;
            B();
            if (str[curr] == 'e')
            {
                curr++;
            }
            else
            {
                invalid();
            }
        }
        else
        {
            invalid();
        }
    }
    else
    {
```

```c
      invalid();
    }
}
//
----------------------------------------------------------------------------------------------------------

void A()
{
    if (str[curr] == 'b')
    {
      curr++;
      Aprime();
    }
    else
    {
      invalid();
    }
}
//
----------------------------------------------------------------------------------------------------------
void Aprime()
{
    if (str[curr] == 'b')
    {
      curr++;
      Aprime();
    }
}
//
----------------------------------------------------------------------------------------------------------

void B()
{
    if (str[curr] == 'd')
    {
      curr++;
    }
    else
    {
      invalid();
    }
}
//
----------------------------------------------------------------------------------------------------------
int main()
{
    printf("Enter String: ");
    scanf("%s", str);
    S();
    if (str[curr] == '$')
      valid();
    else
```

```
        invalid();
}
```

Output :

Q4. *S →(L) | a*
     L → L,S | S

Left Recursion Removed :

S →(L) | a
L → SL'
L' → ,SL' | ε

Code :

```c
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
int curr = 0;
char str[100];
//
------------------------------------------------------------------------------------------------------------------
void S();
void L();
void Lprime();
//
------------------------------------------------------------------------------------------------------------------
void invalid()
{
    printf("----------------ERROR!----------------\n");
    exit(0);
}
void valid()
{
    printf("----------------SUCCESS!---------------\n");
    exit(0);
}
//
------------------------------------------------------------------------------------------------------------------
void S()
{
  if(str[curr] == '('){
  curr++;
```

```c
      L();
      if(str[curr] == ')'){
         curr++;
      }
      else{
         invalid();
      }
   }
   else if(str[curr] == 'a'){
    curr++;
   }
   else{
    invalid();
   }
}
//
----------------------------------------------------------------------------------------------------------------
void L()
{
   S();
   Lprime();
}
//
----------------------------------------------------------------------------------------------------------------
void Lprime()
{
   if(str[curr] == ','){
      curr++;
      S();
      Lprime();
   }
}

//
----------------------------------------------------------------------------------------------------------------
int main()
{
   printf("Enter String: ");
   scanf("%s", str);
   S();
   if (str[curr] == '$')
      valid();
   else
      printf("%c\n", str[curr]);
      invalid();
}
```

Output :

```
cd_d2@prg:~/Documents/220905370_Saivya/Compiler_Design_Lab/lab6$
 ./q4
Enter String: (a)$
----------------SUCCESS!---------------
cd_d2@prg:~/Documents/220905370_Saivya/Compiler_Design_Lab/lab6$
 ./q4
Enter String: a,$
 ,
----------------ERROR!----------------
```