Write a program to check and remove left recursion.[direct/indirect]

Intro:

- A production of grammar is said to have **left recursion** if the leftmost variable of its RHS is same as variable of its LHS.

Code:

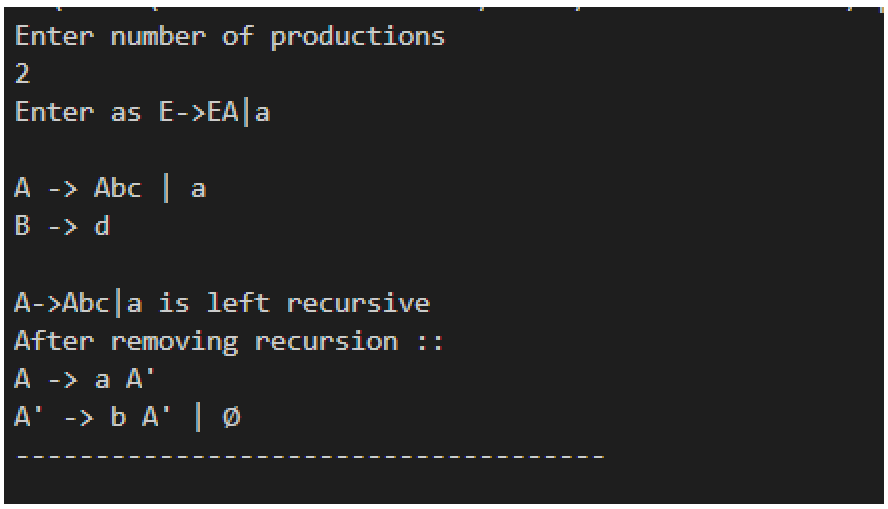
```
print("Enter number of productions")
num = int(input())

productions = []
print("Enter as E->EA|a \n")
while num > 0:
    pr = input().replace(" ", "")
    productions.append(pr)
    num -= 1

print()
# print(productions)
for prod in productions:
    if prod.count('|') == 1:
        if prod[0] == prod[3]:
            print("{} is left recursive".format(prod))
            alpha = prod[4]
            bitaIndex = prod.index('|') + 1
            bita = prod[bitaIndex:]
            print("After removing recursion ::")
            print(f"{prod[0]} -> {bita} {prod[0]}'")
            print(f"{prod[0]}' -> {alpha} {prod[0]}' | Ø")
            print("-------------------------------------")
    elif prod.count('|') > 1:
        if prod[0] == prod[3]:
            # print("{} is left recursive".format(prod))
            prod = prod.split('->')
            nonTerminals = prod[1:][0].split('|')
```

```
alpha = f"{prod[0]}' -> "
bita = f"{prod[0]} -> "
for i in nonTerminals:
    if len(i)>1:
        if prod[0] == i[0]:
            alpha += f"{i[1:]}{prod[0]}' | "
        elif prod[0] not in i:
            bita += f"{i}{prod[0]}' | "
print(bita[:-2])
print(alpha + 'None')
print("-------------------------------------")
```

Output:



```
Enter number of productions
2
Enter as E->EA|a

A -> Abc | a
B -> d

A->Abc|a is left recursive
After removing recursion ::
A -> a A'
A' -> b A' | Ø
-------------------------------------
```