COMPUTE FIRST FOR THE GIVEN GRAMMAR

import sys

sys.setrecursionlimit(60)

def first(string):

first\_ = set()

if string in non\_terminals:

alternatives = productions\_dict[string]

for alternative in alternatives:

first\_2 = first(alternative)

first\_ = first\_ |first\_2

elif string in terminals:

first\_ = {string}

elif string=='' or string=='@':

first\_ = {'@'}

else:

first\_2 = first(string[0])

if '@' in first\_2:

i = 1

while '@' in first\_2:

first\_ = first\_ | (first\_2 - {'@'})

if string[i:] in terminals:

first\_ = first\_ | {string[i:]}

break

elif string[i:] == '':

first\_ = first\_ | {'@'}

break

first\_2 = first(string[i:])

first\_ = first\_ | first\_2 - {'@'}

i += 1

else:

first\_ = first\_ | first\_2

return first\_

no\_of\_terminals=int(input("Enter no. of terminals: "))

terminals = []

print("Enter the terminals :")

for \_ in range(no\_of\_terminals):

terminals.append(input())

no\_of\_non\_terminals=int(input("Enter no. of non terminals: "))

non\_terminals = []

print("Enter the non terminals :")

for \_ in range(no\_of\_non\_terminals):

non\_terminals.append(input())

starting\_symbol = input("Enter the starting symbol: ")

no\_of\_productions = int(input("Enter no of productions: "))

productions = []

print("Enter the productions:")

for \_ in range(no\_of\_productions):

productions.append(input())

productions\_dict = {}

for nT in non\_terminals:

productions\_dict[nT] = []

for production in productions:

nonterm\_to\_prod = production.split("->")

alternatives = nonterm\_to\_prod[1].split("/")

for alternative in alternatives:

productions\_dict[nonterm\_to\_prod[0]].append(alternative)

FIRST = {}

for non\_terminal in non\_terminals:

FIRST[non\_terminal] = set()

for non\_terminal in non\_terminals:

FIRST[non\_terminal] = FIRST[non\_terminal] | first(non\_terminal)

print("FIRST",FIRST)

print("{: ^20}{: ^20}".format('Non Terminals','First',))

for non\_terminal in non\_terminals:

print("{: ^20}{: ^20}".format(non\_terminal,str(FIRST[non\_terminal]),))

**OUTPUT**

