# -\*- coding: utf-8 -\*-

"""8\_19301051\_Kazi Md. Al-Wakil.ipynb

Automatically generated by Colaboratory.

Original file is located at

https://colab.research.google.com/drive/1nxG-ZLwHxQMyza-O4BL4cZHMOTua1pzC

"""

from google.colab import drive

drive.mount('/content/drive')

# lab 1 Task 1

# Question 1

# Corona Infected, Total Infected in a area, Using DFS

t1Openkori = open("/content/drive/MyDrive/CSE422 Labs/Task\_1\_input\_1.txt","r")

inpThekeNiyeStr = t1Openkori.readlines() #storing the inputs line by line

asholMtrxList = [] #matrix akare store korbo sob input gulake. nsted ekta list hobe ei list e

#Matrix list banacchi ekhane

for xqxItar1 in inpThekeNiyeStr:

if xqxItar1[-1]!="\n": #last e ekta line break ache. jodi line break na thake tahole amra normally split korbo

xqxTempLis = xqxItar1.split()

else:

xqxTempLis = xqxItar1[:-1].split() # jodi line break thake tahole amra line break er ag porrjonto slip kore ekta temp list e rakhbo

borobhailanght = len(xqxTempLis) #lenght ber korbo

for xqxItar2 in range(borobhailanght): #lenght borabor ghurabo, list er bhitore prottek ta list k dhore 1,0 banabo

if xqxTempLis[xqxItar2] == "Y": # Y paile 1 banabo

xqxTempLis [xqxItar2] = 1

elif xqxTempLis[xqxItar2] == "N": # N paile 0 banabo

xqxTempLis[xqxItar2] = 0

asholMtrxList.append(xqxTempLis) #1,0 diye j list banaisi, seta k amader main jei list sekhane append kore dilam

#---------------------

asholDic ={} # ei dic e adjucant lst banabo. kon node theke kon node jaitese tar hisab thakbe

asholCountTotalInfcted = 0 #total koto manush er moddhe corona chorailo, kon area te sob cheye beshi chorailo tar hisab eikhane rakhbo

innertempoList = asholMtrxList[0] #nested list er bhitor joto gula iteam ache, segula hoitese amader colum number

xqxlenghtRow = len(asholMtrxList) #main list er bhitor j koyta list ache, segula amader row number

xqxlenghtColam = len(innertempoList)

for rowBorabor in range(xqxlenghtRow):

for colamBorabor in range(xqxlenghtColam):

if asholMtrxList[rowBorabor][colamBorabor]==1:

bortomaneKinfcted = (rowBorabor \* xqxlenghtColam) + colamBorabor # 1 gula kon kon position e ache ta ber korlam.

if bortomaneKinfcted not in asholDic:

asholDic[bortomaneKinfcted] = [] #dictionary create korlam. dictionary te key hisabe 1 gular position ache

#-------------------------------------------------Shuru-------------------------------------------------------------

if rowBorabor < (xqxlenghtRow-1) and asholMtrxList[rowBorabor + 1][colamBorabor] == 1:

neighborInfctd = ((rowBorabor + 1) \* xqxlenghtColam) + colamBorabor

if neighborInfctd not in asholDic:

asholDic[neighborInfctd] = []

asholDic[bortomaneKinfcted].append(neighborInfctd)

asholDic[neighborInfctd].append(bortomaneKinfcted) #kono node theke upore ba niche jawa jay kina dekhtesi

#-------------------------------------------------Cholche-------------------------------------------------------------

if colamBorabor < (xqxlenghtColam-1) and asholMtrxList[rowBorabor][colamBorabor+1] == 1:

neighborInfctd = (rowBorabor \* xqxlenghtColam) + colamBorabor + 1

if neighborInfctd not in asholDic:

asholDic[neighborInfctd] = []

asholDic[bortomaneKinfcted].append(neighborInfctd)

asholDic[neighborInfctd].append(bortomaneKinfcted) #side e kono node ache kina check kortesi

#-------------------------------------------------Cholche-------------------------------------------------------------

if rowBorabor < (xqxlenghtRow-1) and asholMtrxList[rowBorabor+1][colamBorabor-1] == 1:

neighborInfctd = ((rowBorabor + 1) \* xqxlenghtColam) + (colamBorabor - 1)

if neighborInfctd not in asholDic:

asholDic[neighborInfctd] = []

asholDic[bortomaneKinfcted].append(neighborInfctd)

asholDic[neighborInfctd].append(bortomaneKinfcted) #Bam dike konakoni 1 pacchi kina dekhtesi

#-------------------------------------------------Cholche-------------------------------------------------------------

if rowBorabor < (xqxlenghtRow-1) and colamBorabor < (xqxlenghtColam-1) and asholMtrxList[rowBorabor+1][colamBorabor+1] == 1:

neighborInfctd = ((rowBorabor + 1) \* xqxlenghtColam) + (colamBorabor + 1)

if neighborInfctd not in asholDic:

asholDic[neighborInfctd] = []

asholDic[bortomaneKinfcted].append(neighborInfctd)

asholDic[neighborInfctd].append(bortomaneKinfcted) #dan dike konakoni 1 pacchi kina dekhtesi

#-------------------------------------------------Khotom-------------------------------------------------------------

asholMtrxList\_dup = []

for i\_xqx1 in asholMtrxList:

for i\_xqx2 in i\_xqx1:

asholMtrxList\_dup.append(i\_xqx2) # Ekta temporary matrx banailam, jekhane amar ashol matrix er sob content rakha ache. duplicate matrx bola jay,

# duplicate matrix er er proti node visit kora hobe,ekbar visit kore -1 kore dibo sei node k.

#-------------------------------------------------Shuru-------------------------------------------------------------

def dqfxsBro (infctdNdes, koriAmraCount):

asholMtrxList\_dup[infctdNdes] = -1 #jehetu visit korsi, tai -1 kore dilam

koriAmraCount = koriAmraCount+1 # koto jon infcted eta ber korbo ei var diya

for i\_xqx1 in asholDic[infctdNdes]:

if asholMtrxList\_dup[i\_xqx1] == 1: #1 hole to visited na. taile dfs chalabo oi node er upor

koriAmraCount = dqfxsBro(i\_xqx1,koriAmraCount)

return koriAmraCount

#-------------------------------------------------Khotom-------------------------------------------------------------

for i\_xqx1key in asholDic.keys():

dfsthekepawavalue = dqfxsBro(i\_xqx1key, 0) #Node pathailam r, sathe count korar jonno ekta number pathailam. number shuru 0 theke.

if dfsthekepawavalue > asholCountTotalInfcted:

asholCountTotalInfcted = dfsthekepawavalue #highest val ta e rakha hobe

print("Max people infected in a region: ",asholCountTotalInfcted)

#Done

t1Openkori.close

# lab 1 Task 2

# Question 2

# There is an Alien(Xenomorph) Apocalypse in XCITY and every minute Aliens are attacking human beings around them......

# Using BFS

t2Openkori = open("/content/drive/MyDrive/CSE422 Labs/Task\_2\_input\_1.txt","r")

inpThekeNiyeStr = t2Openkori.readlines() #storing the inputs line by line

asholMtrxList = [] #matrix akare store korbo sob input gulake. nsted ekta list hobe ei list e

noNeedCnt = 0

#Matrix list banacchi ekhane

for xqxItar1 in inpThekeNiyeStr:

if xqxItar1[-1]!="\n": #last e ekta line break ache. jodi line break na thake tahole amra normally split korbo

xqxTempLis = xqxItar1.split()

else:

xqxTempLis = xqxItar1[:-1].split() # jodi line break thake tahole amra line break er ag porrjonto slip kore ekta temp list e rakhbo

if noNeedCnt == 0:

temp\_row = int(xqxTempLis[0]) #temp\_row koyta ber korchi

noNeedCnt+=1

elif noNeedCnt == 1:

temp\_colam = int(xqxTempLis[0]) #Colam koyta ber korchi

noNeedCnt+=1

else:

borobhailanght = len(xqxTempLis) #lenght ber korbo

for xqxItar2 in range(borobhailanght): #lenght borabor ghurabo, list er bhitore prottek ta list k dhore 1,0 banabo

if xqxTempLis[xqxItar2] == "A": # Allien paile -1 banabo

xqxTempLis [xqxItar2] = -1

elif xqxTempLis[xqxItar2] == "H": # Human paile 0 banabo

xqxTempLis[xqxItar2] = 0

asholMtrxList.append(xqxTempLis) #1,0 diye j list banaisi, seta k amader main jei list sekhane append kore dilam. ekta nested list hoilo

asholRow = temp\_row #raw store korlam

asholColam = temp\_colam #colam store korlam

#---------------------

humLifeCnt = 0 #total koyjon survivar ache, ei variable diye check korbo

alirActualPos = [] #alien der pasiton gula tuple akare ei list e rakhbo. time to time update korbo

shomoy = 0 #total time

#-------------------------------------------------Def shuru---------------------------------------------------

def humAndAlirPos():

global humLifeCnt

for ab in range(asholRow):

for cd in range(asholColam):

if asholMtrxList[ab][cd] == 0:

humLifeCnt = humLifeCnt +1 #jokhon e kono human pabo, take initial sarvivor var er sathe add kore dibo. ei var theke amra total sarvivor koto jon ache ta bujhte parbo

elif asholMtrxList[ab][cd] == -1:

alirActualPos.append((ab,cd)) #alien der postion matrix er kon pos e ache, seta tuple akare rakhbo.

humAndAlirPos()

#-------------------------------------------------Def khotom--------------------------------------------------

#-------------------------------------------------Def shuru---------------------------------------------------

def bqfxsBro():

global humLifeCnt

global alirActualPos

global shomoy

alirTempPos = [] #ekta temporary list. ekhane per time e koto jon human k alien banano hoilo, newly alien howader pos niye ekta tuple ei list e append hobe.

while len(alirActualPos):

algaTemp = alirActualPos.pop(0)

r\_Wise = algaTemp[0]

col\_Wise = algaTemp[1]

#---------------------------------------------Checking shuru--------------------------------------------------

#top to bottom e kono alien ache kina dekhtesi

if (r\_Wise-1 >= 0) and (col\_Wise <= asholColam-1) and asholMtrxList[r\_Wise-1][col\_Wise] == 0: #top e kono human ache kina dekhtesi

asholMtrxList[r\_Wise-1][col\_Wise] = -1 #visit kora done, tai -1 kore dicchi

alirTempPos.append((r\_Wise-1,col\_Wise)) #top e thaka human k alien baniye, tar position diye dilam tempo list e

humLifeCnt = humLifeCnt - 1 #sarvivor komtese

if (r\_Wise+1 <= asholRow-1) and (col\_Wise <= asholColam-1) and asholMtrxList[r\_Wise+1][col\_Wise] == 0: #bottom e kono human ache kina dekhtesi

asholMtrxList[r\_Wise+1][col\_Wise] = -1 #visit kora done, tai -1 kore dicchi

alirTempPos.append((r\_Wise+1,col\_Wise)) #bottom e thaka human k alien baniye, tar position diye dilam tempo list e

humLifeCnt = humLifeCnt - 1 #sarvivor komtese

#---------------------------------------------Checking shuru--------------------------------------------------

#right to left e kono alien ache kina dekhtesi

if (r\_Wise <= asholRow-1) and (col\_Wise+1 <= asholColam-1) and asholMtrxList[r\_Wise][col\_Wise+1] == 0: #right e kono human ache kina dekhtesi

asholMtrxList[r\_Wise][col\_Wise+1] = -1 #visit kora done, tai -1 kore dicchi

alirTempPos.append((r\_Wise,col\_Wise+1)) #right e thaka human k alien baniye, tar position diye dilam tempo list e

humLifeCnt = humLifeCnt - 1 #sarvivor komtese

if (r\_Wise <= asholRow-1) and (col\_Wise-1 >=0) and asholMtrxList[r\_Wise][col\_Wise-1] == 0: #left e kono human ache kina dekhtesi

asholMtrxList[r\_Wise][col\_Wise-1] = -1 #visit kora done, tai -1 kore dicchi

alirTempPos.append((r\_Wise,col\_Wise-1)) #left e thaka human k alien baniye, tar position diye dilam tempo list e

humLifeCnt = humLifeCnt - 1 #sarvivor komtese

#---------------------------------------------Checking Khotom-------------------------------------------------------------

lenghtTempPos = len(alirTempPos)

if lenghtTempPos > 0: #jodi temp list "alirTempPos" e kono tuple thake,

alirActualPos = alirTempPos #tahole notun alien howa human gular pos amra copy korbo amader actual alien der postion e. karon puran postion diye amra kaj kore felsi

# ekhon notun jara alien hoise, tader theke kon human alien hoite parbe seta amra ber korbo, tar jonno copy kore dilam amader main list e.

shomoy = shomoy +1 #ekbar hum der alien banano hoye gele, amra somoy ek kore baray dibo.

#-------------------------------------------------Def Khotom-------------------------------------------------------------

while len(alirActualPos): #loop ta cholbe, jotokhon porjonto amader alien er position er jonno dedicated list ta faka na hoy.

#faka howa mane amader alienpostion list e emon kono alien nai, jar dara kono human alien hoite parbe. sob possible human k alein banano sesh

#tokhon amra bfs r chalabo na. loop break hobe.

bqfxsBro()

print("Time: ", shomoy, "minutes.")

if humLifeCnt <=0: #human count jodi 0 or 0 er theke kom hoy, tar mane keu beche nai. sob dead

print("No one Survived.")

else:

print(humLifeCnt, "survived.")

#Done

t2Openkori.close