Dim chi0, i, rho, sigma2, punti, dt, giorni, t, rho0, area

Dim c, dc, g, m, D, ti, DSL

Dim dg, dti, p, morti, dp, ds, s, dm, k

Dim f, q, t1, t2, t3, t4, t0, dv, rt, passo, n, superiore

Dim qv, tt, pteta

Dim vac(500), casi(25000), positivi(25000), densi(25000)

Dim b$

Open "/Users/spinella/Desktop/Covid+/Italia.csv" for output as #1

Open "/Users/spinella/Desktop/Covid+/Italia RT.csv" for output as #6

Open "/Users/spinella/Desktop/Covid+/Italia vaccinazioni.txt" for input as #2

qv=0

g3: if eof(2) then g4

qv=qv+1

input #2,b$: vac(qv)=val(b$)

goto g3

g4: close #2

area=302072.84\*1E6

rho=60360000/area : rho0=rho

sigma2=3.1415

f=0.035

chi0=127/f

q=0.15

t1=7.2

t2=20

t3=14

t0=315

punti=160000

giorni=800

dt=giorni/punti

t=0: g=0: dg=0: c=chi0/area: ti=f\*chi0/area: s=(1-f)\*chi0/area: p=chi0/area: morti=0: dm=0: dv=0

n=0: k=1

DSL=267300

for i=1 to punti

if t>80 then q=0.1

if t>265 then q=0.14

D=DSL+(2686545-DSL)/(EXP((t-24)/8.7)+1)

if t>=102 and t<212 then D=895840+(256500-895840)/(EXP((t-162)/15)+1)

if t>=212 and t<245 then D=1328032+(875440-1328032)/(EXP((t-232)/3.5)+1)

' imposing general lockdown after October 25, 2020

' if t>=245 then D=DSL+(1448000-DSL)/(EXP((t-263.2)/8.8)+1)

' come back to level 2.1

if t>=245 and t<298 then D=DSL\*1.8+(1430000-DSL\*1.8)/(EXP((t-260)/7.6)+1)

if t>=298 and t<320 then D=DSL\*2.65+(265518\*1.8-DSL\*2.65)/(EXP((t-308)/3)+1)

if t>=320 then D=DSL\*2.1+(DSL\*2.65-DSL\*2.1)/(EXP((t-325)/1.3)+1)

' asymptotic simulation of returning to values of end of summer 2020

' if t>=245 and t<298 then D=DSL\*1.8+(1430000-DSL\*1.8)/(EXP((t-260)/7.6)+1)

' if t>=298 and t<320 then D=DSL\*2.65+(265518\*1.8-DSL\*2.65)/(EXP((t-308)/3)+1)

' if t>=320 and t<350 then D=DSL\*2.1+(DSL\*2.65-DSL\*2.1)/(EXP((t-325)/1.3)+1)

‘ if t>=350 then D=DSL\*3.25+(DSL\*2.1- DSL\*3.25)/(EXP((t-385)/4)+1)

dp=D\*rho0\*sigma2\*(rho-c)\*p\*dt-dg-dm: p=p+dp

dti=f\*D\*rho0\*sigma2\*(rho-c)\*p\*dt-(1-q)\*ti\*dt/t2-q\*ti\*dt/t1: ti=ti+dti

dm=q\*ti\*dt/t1: morti=morti+dm

ds=(1-f)\*D\*rho0\*sigma2\*(rho-c)\*p\*dt-s\*dt/t3: s=s+ds

dg=s\*dt/t3+(1-q)\*ti\*dt/t2: g=g+dg

dc=D\*rho0\*sigma2\*(rho-c)\*p\*dt: c=c+dc

if t>=t0+k-1 then

if k>qv then dv=(vac(qv-6)+vac(qv-5)+vac(qv-4)+vac(qv-3)+vac(qv-2)+vac(qv-1)+vac(qv))/7

if k<=qv then dv=vac(k)

rho=rho-dv/area

k=k+1

if rho-c<=0 or p<=0 then v55

end if

t=t+dt

if i/50-int(i/50)=0 then

print #1,t,",",

print #1,p\*area ,",",

print #1,g\*area ,",",

print #1,ti\*area ,",",

print #1,morti\*area ,",",

print #1,c\*area ,",",

print #1,D ,",",

write #1,""

end if

if i/10-int(i/10)=0 then

n=n+1

casi(n)=c

positivi(n)=p

densi(n)=rho

end if

next i

v55: close #1

passo=10\*giorni/punti

superiore=int(60/passo)

q=0.15

for i=1 to n-superiore step 5

rt=0

c=0: tt=0

k=i+1

v8: if passo\*k>80 then q=0.1

if passo\*k>265 then q=0.14

D=DSL+(2686545-DSL)/(EXP((passo\*k-24)/8.7)+1)

if passo\*k>=102 and passo\*k<212 then D=895840+(256500-895840)/(EXP((passo\*k-162)/15)+1)

if passo\*k>=212 and passo\*k<245 then D=1328032+(875440-1328032)/(EXP((passo\*k-232)/3.5)+1)

' come back to level 2.1

if passo\*k>=245 and passo\*k<298 then D=DSL\*1.8+(1430000-DSL\*1.8)/(EXP((passo\*k-260)/7.6)+1)

if passo\*k >=298 and passo\*k <320 then D=DSL\*2.65+(265518\*1.8-DSL\*2.65)/(EXP((passo\*k -308)/3)+1)

if passo\*k >=320 then D=DSL\*2.1+(DSL\*2.65-DSL\*2.1)/(EXP((passo\*k -325)/1.3)+1)

' asymptotic simulation of returning to values of end of summer 2020

' if passo\*k >=245 and passo\*k <298 then D=DSL\*1.8+(1430000-DSL\*1.8)/(EXP((passo\*k -260)/7.6)+1)

' if passo\*k >=298 and passo\*k <320 then D=DSL\*2.65+(265518\*1.8-DSL\*2.65)/(EXP((passo\*k -308)/3)+1)

' if passo\*k >=320 and passo\*k <350 then D=DSL\*2.1+(DSL\*2.65-DSL\*2.1)/(EXP((passo\*k -325)/1.3)+1)

‘ if passo\*k>=350 then D=DSL\*3.25+(DSL\*2.1- DSL\*3.25)/(EXP((passo\*k-385)/4)+1)

pteta=(1-f)\*exp(-passo\*(k-i-1)/t3)+f\*exp(-((t1+q\*(t2-t1))/t1/t2)\*passo\*(k-i-1))

c=c+passo\*D\*rho0\*sigma2\*(densi(k)-casi(k))\*pteta

tt=tt+k\*passo\*D\*rho0\*sigma2\*(densi(k)-casi(k))\*pteta

k=k+1: if k>n then v155

if pteta>=1/50 then v8

v45: rt=c: tt=passo\*tt/c

print #6, (i-1)\*passo,",",

print #6, tt,",",

print #6, rt, ",",

print #6, (densi(i)-casi(i))\*area, ",",

write #6,""

next i

v155: close #6