Lucky Lao

DSC-VI : Practical-10

Epidemic Model for Influenza

1 Basic Epidemic Model

S(t): susceptibles at time t
I(t): infectives at time t
Initial condition: S(0)=762, I(0)=1.
The constants b,c are all positive

```
--> b : 2 . 18 · 10 ^ − 3 $ c : 0 . 44 $
    eqn1 : ' diff ( S , t ) = − b · S · I ;
    eqn2 : ' diff ( I , t ) = b · S · I − c · I ;
    pts : rk ( [ rhs ( eqn1 ) , rhs ( eqn2 ) ] , [ S , I ] , [ 762 , 1 ] , [ t , 0 , 16 , 0 . 1 ] ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    susc : makelist ( [ pts [ i ] [ 1 ] , pts [ i ] [ 2 ] ] , i , 1 , length ( pts ) ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    infec : makelist ( [ pts [ i ] [ 1 ] , pts [ i ] [ 3 ] ] , i , 1 , length ( pts ) ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    wxplot2d ( [ [ discrete , susc ] , [ discrete , infec ] ] ,
          [ t , 0 , 16 ] , [ y , 0 , 800 ] ,
          [ style , [ lines , 2 ] , [ lines , 4 ] ] ,
          [ xlabel , "t (in days)" ] ,
          [ ylabel , "Susceptibles and Infectives Population" ] ,
          [ legend , "S(t): Susceptibles" , "I(t): Infectives" ] ) $
```

$$\frac{d}{dt}S = -0.00218IS$$

$$\frac{d}{dt}I = 0.00218IS - 0.44I$$

$$[[0.0\,,762.0\,,1.0]\,,[16.0\,,20.37747256075321\,,11.67419228363819]\,,161]$$

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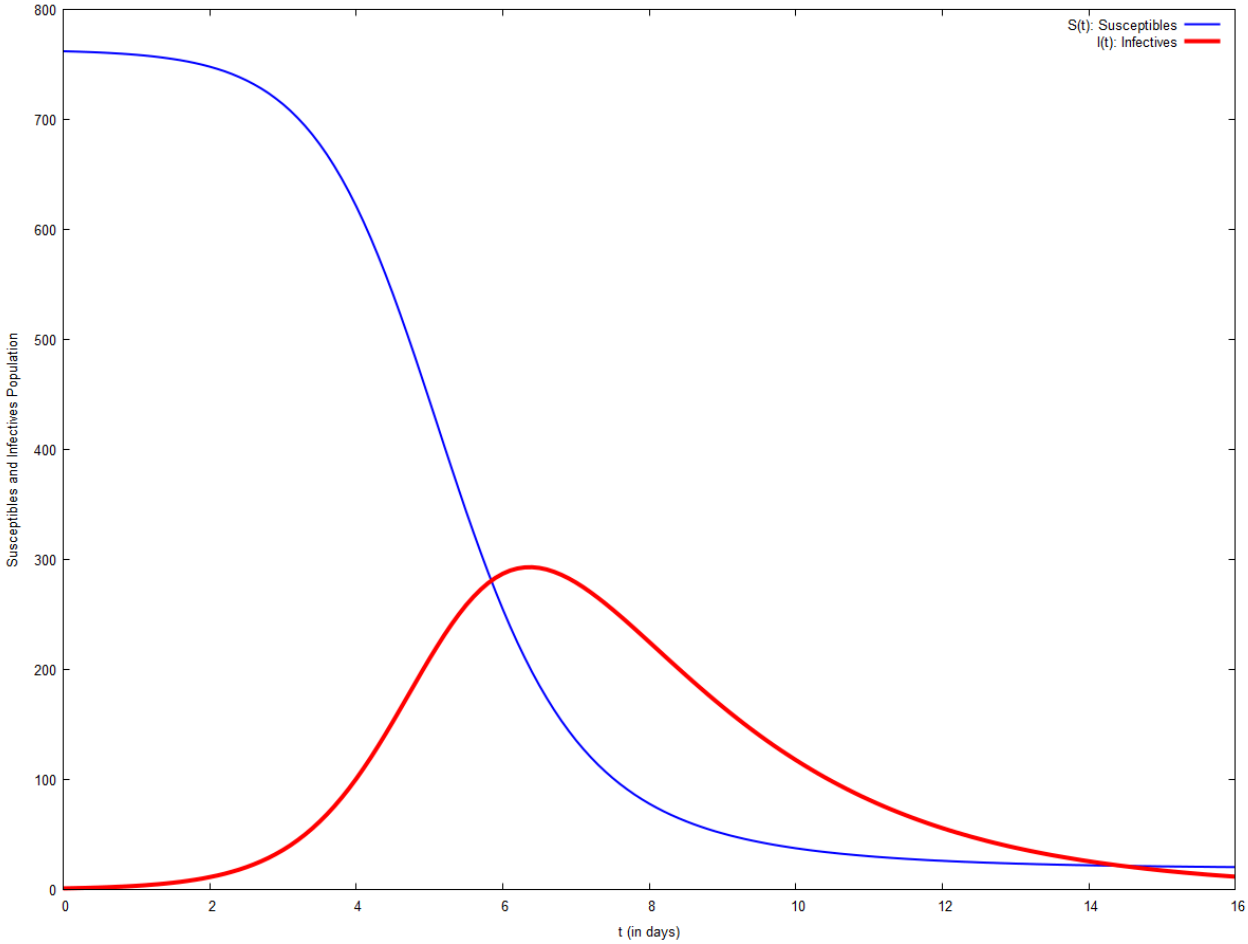
$$[[0.0\,,1.0]\,,[16.0\,,11.67419228363819]\,,161]$$



2 Contagious for Life

S(t): susceptibles at time t
I(t): infectives at time t
Initial condition: S(0)=762, I(t)=1.
The constant b is positive.

```
--> b : 2 . 18 · 10 ^ − 3 $
    eqn1 : ' diff ( S , t ) = − b · S · I ;
    eqn2 : ' diff ( I , t ) = b · S · I ;
    pts : rk ( [ rhs ( eqn1 ) , rhs ( eqn2 ) ] , [ S , I ] , [ 762 , 1 ] , [ t , 0 , 16 , 0 . 1 ] ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    susc : makelist ( [ pts [ i ] [ 1 ] , pts [ i ] [ 2 ] ] , i , 1 , length ( pts ) ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    infec : makelist ( [ pts [ i ] [ 1 ] , pts [ i ] [ 3 ] ] , i , 1 , length ( pts ) ) $
    [ % [ 1 ] , last ( % ) , length ( % ) ] ;
    wxplot2d ( [ [ discrete , susc ] , [ discrete , infec ] ] ,
          [ t , 0 , 16 ] , [ y , 0 , 800 ] ,
          [ style , [ lines , 2 ] , [ lines , 4 ] ] ,
          [ xlabel , "t (in days)" ] , [ ylabel , "Susceptibles and Infectives Population" ] ,
          [ legend , "S(t): Susceptibles" , "I(t): Infectives" ] ) $
```

$$\frac{d}{dt}S = -0.00218IS$$

$$\frac{d}{dt}I = 0.00218IS$$

$$\left[\left[0.0\,,762.0\,,1.0\right],\left[16.0\,,1.60870825366987910^{-6}\,,762.9999983912916\right],161\right]$$

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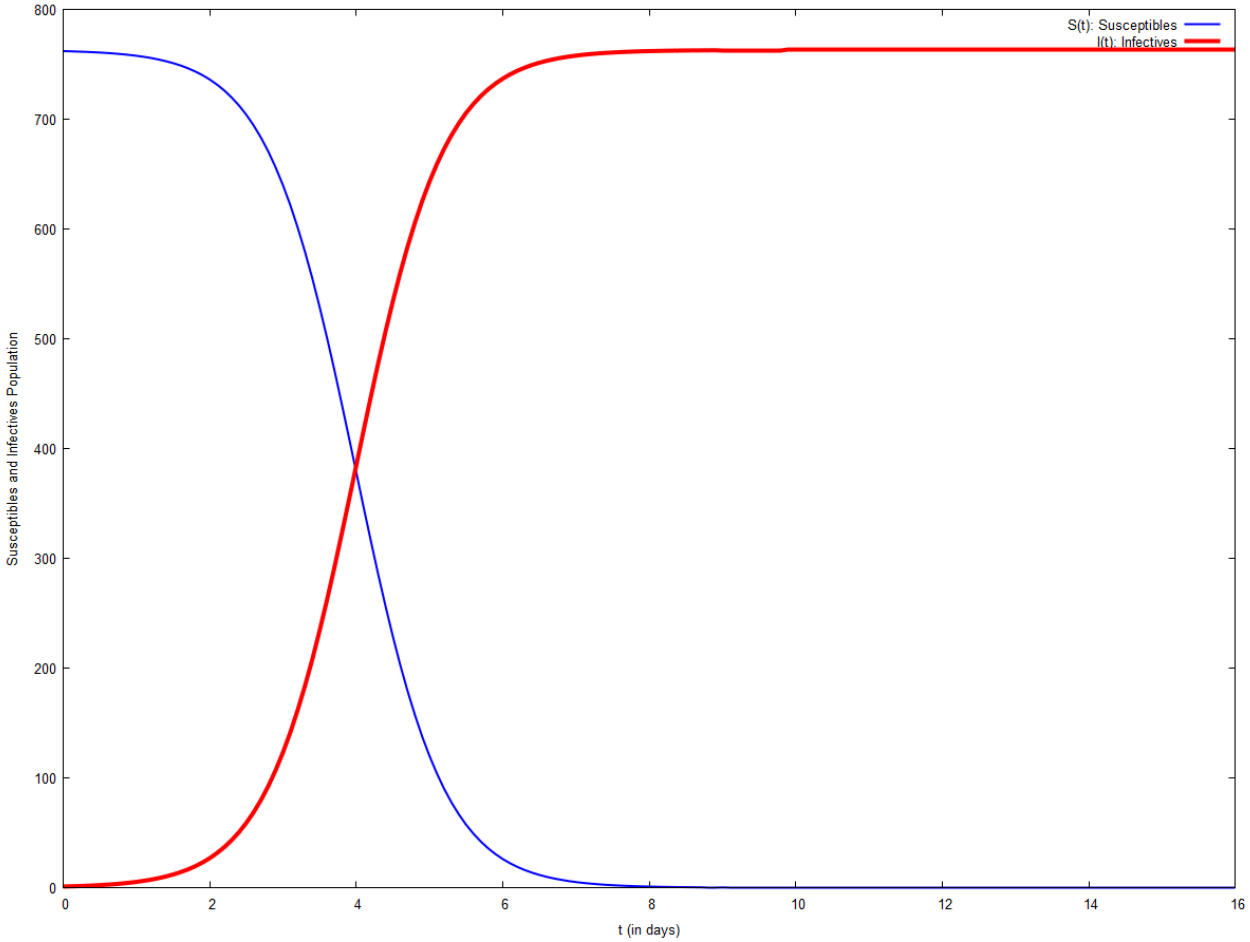
$$[[0.0\,,1.0]\,,[16.0\,,762.9999983912916]\,,161]$$



Created with wxMaxima.
The source of this Maxima session can be downloaded here.