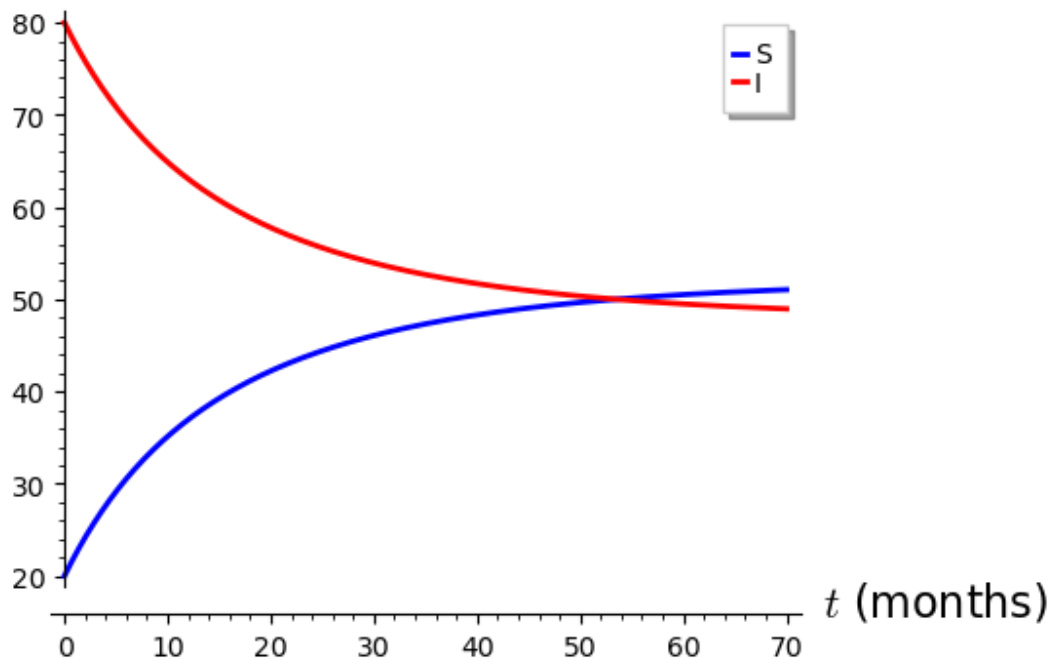


Modeling the spread of grassroots political views

These are explorations of SIRS types of models for fitting Pew Research Center data on public opinion about the U.S. war against Iraq. We first consider an SIS model, followed by SIRS.

```
In [12]: # SIS model
#
s, i, t = var('s i t')
b = 0.08967
g = 0.04663
s0 = 20
i0 = 80
de1 = - b*s*i/100 + g*i
de2 = b*s*i/100 - g*i
P = desolve_system_rk4 ([de1, de2], [s, i],
ics=[0, s0, i0], ivar=t, end_points=[0,70] )
Q = [ [i,j] for i, j, k in P]
P1 = line(Q, thickness=2, legend_label='S')
Q = [ [i,k] for i, j, k in P]
P2 = line(Q, thickness=2, color='red',
axes_labels=['t$ (months)', r'$\#$ of people'], legend_label='I')
show(P1+P2)
```

of people



SIZS model

$$S' = -\beta_i \frac{(S+Z)I}{N} - \beta_z \frac{(S+I)Z}{N} + \gamma_i I + \gamma_z Z$$

$$I' = \beta_i \frac{(S+Z)I}{N} - \gamma_i I$$

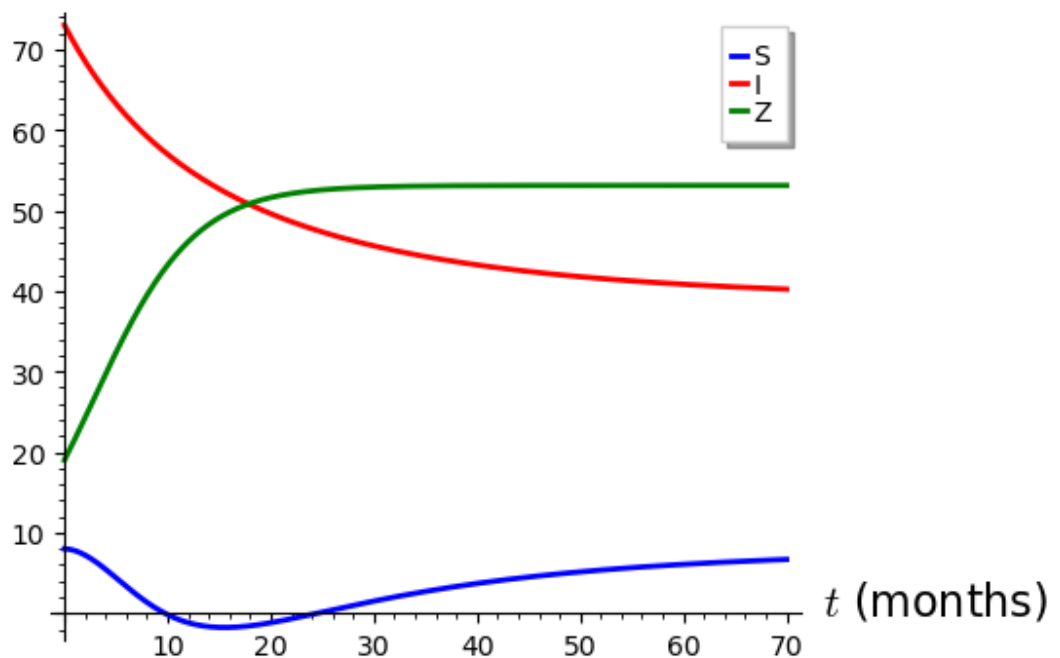
$$Z' = \beta_z \frac{(S+I)Z}{N} - \gamma_z Z$$

```

In [16]: # SIZS model
#
s, i, z, t = var('s i z t')
bi = 0.1
bz = 0.388
gi = 0.061
gz = 0.182
s0 = 8
i0 = 73
z0 = 19
n = 100
de1 = - bi*(s+z)*i/n - bz*(s+i)*z/n + gi*i + gz*z
de2 = bi*(s+z)*i/n - gi*i
de3 = bz*(s+i)*z/n - gz*z
P = desolve_system_rk4 ([de1, de2, de3], [s, i, z],
ics=[0, s0, i0, z0], ivar=t, end_points=[0,70] )
Q = [ [i,j] for i, j, k, l in P]
P1 = line(Q, thickness=2, legend_label='S')
Q = [ [i,k] for i, j, k, l in P]
P2 = line(Q, thickness=2, color='red', legend_label='I')
Q = [ [i,l] for i, j, k, l in P]
P3 = line(Q, thickness=2, color='green',
axes_labels=['t$ (months)', r'$\#$ of people'], legend_label='Z')
show(P1+P2+P3)

```

of people



In []: