



Figure 9.3.: Simulation of epidemic dynamics.

## 9.4. Motion of a mass

Let's simulate the discretized model of the motion of a mass in section 9.4 of VMLS.

```
In [ ]: h = 0.01
m = 1
eta = 1
A = np.block([[1,h],[0, 1-h*eta/m]])
B = np.vstack([0,h/m])
x1 = np.array([0,0])
K = 600 #simulate for K*h = 6 seconds
f = np.zeros((K));
f[49:99] = 1
f[99:139] = -1.3
X = np.column_stack([x1, np.zeros((2, K-1))])
for k in range(K-1):
    X[:, k+1] = A @ X[:, k] + f[k]*B.T
import matplotlib.pyplot as plt
plt.ion()
plt.plot(X[0,:])
plt.xlabel('k')
plt.ylabel('Position')
```

## 9. Linear dynamical systems

```
plt.show()
plt.plot(X[1,:])
plt.xlabel('k')
plt.ylabel('Velocity')
plt.show()
```

### 9.5. Supply chain dynamics