Problem 14 (Page 435) Extended
See Matlab diary for calculations.

1. Suppose in a given year we have 1% of the population chronically insane, 12% mildly insane and 87% sane. What percent of the population is expected to be chronically insane after one year? After two years?

Answer: Let $X_0=\begin{bmatrix}.01\\0\\.87\\.12\end{bmatrix}$. Calculate $T*X_0=\begin{bmatrix}.0124\\.0209\\.8526\\.1141\end{bmatrix}$ and $T^2*X_0=\begin{bmatrix}.0147\\.0414\\.8355\\.0184\end{bmatrix}$

1.24% after one year; 1.47% after 2 years;

2. What percent of mildly insane people will be chronically insane after one year? After two years?

Answer: Use T and T^2 to get the information about people who start in state IV. The percent is taken from column 4, row 1of T: 2% after one year; From the same position in T^2: 3.9% after two years

3. Suppose 200 people are mildly insane. How many of these people will be chronically insane after two years?

Answer: (use information problem 2 above) *3.9% of 200=7.8* people

4. Find the percent of mildly insane people who will eventually become chronically insane.

Answer: Calculate the stable matrix for this process.
40% of mildly insane people eventually end up chronically insane.

```
>> T=[1 0 0 .02;0 1 .01994 .03;0 0 .98 0;
0 0 .00006 .95]
T =

   1.0000         0         0    0.0200
        0    1.0000    0.0199    0.0300
        0         0    0.9800         0
        0         0    0.0001    0.9500

>> X0=[.01;0; .87;.12]
X0 =

    0.0100
         0
    0.8700
    0.1200

>> T*X0
ans =

    0.0124
    0.0209
    0.8526
    0.1141

>> T^2*X0
ans =

    0.0147
    0.0414
    0.8355
    0.1084

>> T^2
ans =

   1.0000         0    0.0000    0.0390
        0    1.0000    0.0395    0.0585
        0         0    0.9604         0
        0         0    0.0001    0.9025

>>% To find the stable matrix
>>% partition T and identify the
>>% submatrices S and R

 >> S=T(1:2,3:4)

S =

         0    0.0200
    0.0199    0.0300

>> R=T(3:4,3:4)

R =

    0.9800         0
    0.0001    0.9500

>> S*inv(eye(2)-R)

ans =

    0.0012    0.4000
    0.9988    0.6000

>> stableT=[1 0 .0012 .4;0 1 .9988 .6;0
0 0 0;0 0 0 0]

stableT =

   1.0000         0    0.0012    0.4000
        0    1.0000    0.9988    0.6000
        0         0         0         0
        0         0         0         0
```