Math 54 Homework 6
Due Tuesday July 23

1. In section 5.3 of Lay, do problems 4, 6, 31, 32

2. In section 5.5 of Lay, do problems 1, 2

3. Suppose you play the following game. You start with 80 points. If you get to 100 points, you win and if you get to 0 points you lose. Every turn you press a button which either increases or decreases your score. It has a 49% chance of increasing your score by one point and a 51% chance of decreasing your score by one point. What is the chance that you win the game?=

   Hint: let a_n be the chance you win if you start with n points. Then $a_0 = 0$ and $a_{100} = 1$. Then

   $$a_n = pa_{n+1} + qa_{n-1}$$

   where $p = 0.49$ and $q = 0.51$. Then $a_{n+1} = \frac{1}{p}a_n - \frac{q}{p}a_{n-1}$ so

   $$\begin{pmatrix} 0 & 1 \\ -\frac{q}{p} & \frac{1}{p} \end{pmatrix} \begin{pmatrix} a_{n-1} \\ a_n \end{pmatrix} = \begin{pmatrix} a_n \\ a_{n+1} \end{pmatrix}.$$