Homework 4

Mathematics in Computer Science

1. Find close form solutions for the following recurrence equations. Check the first four values of your answer.

   (a) $f(n) = 5(fn - 1) - 6f(n)$ with boundary conditions $f(0) = 0$ and $f(1) = 1$.

   (b) $f(n) = 6f(n-1) - 12f(n-2) + 8f(n-3)$ with boundary conditions $f(0) = 1$, $f(1) = 6$, and $f(2) = 32$.

2. Solve the recurrence equation $f(n) = -4f(n-2)$ for which the characteristic equation has imaginary roots. Clearly $f(n)$ must be real for all values of n.

   (a) What is the characteristic equation?

   (b) What are the roots?

   (c) What is the most general form of solution to the recurrence equation?

   (d) Use the boundary conditions to find the specific solution of the recurrence equation and the boundary conditions.

   (e) What values does your solution give for $f(n)$ for $n = 2, 3, 4,$ and 5?

3. What is the form of the most general solution to the recurrence equation
   $f(n) = 5f(n-1) - 8f(n-2) + 4f(n-3)$?