CS111 ASSIGNMENT 3

Problem 1: We want to tile an $n \times 1$ strip with tiles of two types: 1×1 tiles that are dark-blue, light-blue, and red, and 2×1 green tiles. Give a formula for the number of such tilings T_n, considering that blue tiles cannot be next to each other. Your solution must include a recurrence equation (with initial conditions!), and a full justification. You do not need to solve it.

Problem 2: Solve the following recurrence equation:

$$\begin{aligned} f_n &= f_{n-1} + 4f_{n-2} + 2f_{n-3} \\ f_0 &= 0 \\ f_1 &= 1 \\ f_2 &= 2 \end{aligned}$$

Show your work (all steps: the characteristic polynomial and its roots, the general solution, using the initial conditions to compute the final solution.)

Problem 3: Solve the following recurrence equation:

$$\begin{aligned} f_n &= 13f_{n-2} + 12f_{n-3} + 2n + 1 \\ f_0 &= 0 \\ f_1 &= 1 \\ f_2 &= 1 \end{aligned}$$

Show your work (all steps: the associated homogeneous equation, the characteristic polynomial and its roots, the general solution of the homogeneous equation, computing a particular solution, the general solution of the non-homogeneous equation, using the initial conditions to compute the final solution.)

Problem 4: Find a particular solution of the recurrence equation:

$$t_n = 4t_{n-1} + t_{n-2} + 3 \cdot 2^n$$

Show your work.