CS111 Practice Quiz 3

Problem 1:

(a) Let D_n be a sequence defined by a recurrence equation whose characteristic equation has roots $-1, 2, 3$, each with multiplicity 1. Give the general solution form of this recurrence.

(b) Give the general form of the solution of the recurrence $U_n = 16U_{n-2}$.

(c) Solve the recurrence $R_n = 5R_{n-1} + 6R_{n-2}$, with initial conditions $R_0 = 1$, $R_1 = 13$.

Problem 2:

Let T_n denote the number of strings of length n consisting of letters `A`, `B` and `C`, that do not contain any substrings `BC` and `CC`. For example, `ACABB` and `CBAABAC` are valid strings, while `AABCAB` is not. Set up and justify the recurrence for T_n. (Do not solve it.)

Problem 3:

Determine the *general solution* of the recurrence equation $f_n = 2f_{n-1} + 3f_{n-2} + 2 \cdot 3^n$. You must show and clearly mark all steps: (i) Characteristic equation and its solution, (ii) general solution of the homogeneous equation, (iii) particular solution of the nonhomogeneous equation, (iv) general solution of the nonhomogeneous equation.

Problem 4:

Solve the recurrence: $f_n = 2f_{n-1} + 3f_{n-2} + 3$ with initial conditions $f_0 = 1, f_1 = -2$. You must show and clearly mark all steps: (i) Characteristic equation and its solution, (ii) general solution of the homogeneous equation, (iii) particular solution of the nonhomogeneous equation, (iv) general solution of the nonhomogeneous equation, (v) initial conditions equations and their solution, (vi) final answer.
