Syllabus for CS111 Quiz 3

Topics:

- Linear homogeneous recurrences equations
  - Give the recurrence relation for Fibonacci numbers. (Should also be able to prove that F_n grows exponentially with n.)
  - Setting up recurrence equations.
    - Example: One female rabbit produces 3 female rabbits per week, starting the 2nd week after its born. You receive one newly-born female rabbit for your birthday. How many female rabbits you will have after n weeks? (These are genetically modified female rabbits that do not need male rabbits for reproduction.)
    - Example: We tile an n-by-1 strip using 1-by-1, 2-by-1 and 3-by-1 tiles. Let t_n be the number of such tilings. Give a recurrence for t_n.
    - Example: Modify the last problem by allowing tiles of two colors, say red and green. Give a recurrence for the number of such tilings.
  - Solving linear homogeneous recurrence equations.
    - Example: Solve: $f_n = 5f_{n-1} - 6f_{n-2}$, with initial conditions $f_0 = 1$, $f_1 = 2$.
    - Example: Determine the general solution of the recurrence $h_n = 5h_{n-1} -3h_{n-2} - 9\ h_{n-3}$
- Linear non-homogeneous recurrences equations
  - Solve the recurrence $D_n = 3D_{n-1} +1$, $D_0 = 0$.
  - Find a general solution of the recurrence $f_n = 5f_{n-1} - 6f_{n-2} + 2^n$.
  - Find a particular solution of the recurrence $g_n = 5g_{n-1} - 6g_{n-2} + 2^n$.
