**Syllabus for the CS111 Quiz 4**

**Topics:**

* Linear non-homogeneous recurrences equations
  + Solve the recurrence Dn = 3Dn-1 +2n, D0 = 0.
  + Find a particular solution of the recurrence fn = 5fn-1 - 6fn-2 + n+5.
  + Find a particular solution of the recurrence gn = 5gn-1 - 6gn-2 + 2n.
* Divide-and-conquer recurrence equations
  + State the Master Theorem
  + Give an (asymptotic) solution to the following recurrence: f(n) = 3f(n/2) + 3n
  + Give an (asymptotic) solution to the following recurrence: f(n) = 8f(n/2) + 5\*n4
  + Given the pseudo-code below, what is the (asymptotic) number of lines printed on input n? ...
* Inclusion-Exclusion
  + Give a complete statement of the inclusion-exclusion principle.
  + Suppose that we have sets A, B, C such that |A|= 22, |B| = 36, |C| = 26, |A ∩ B| = 2|A ∩ B ∩ C|, |A ∩ C| = 3|A ∩ B ∩ C|, |B ∩ C| = 4|A ∩ B ∩ C|, |A ∪ B ∪ C| = 13|A ∩ B ∩ C|. Determine the number of elements in the of these three sets.
  + Compute the number of permutations of {1,2,3,4,5,6,7,8,9} in which either 2,3,4 are consecutive or 4,5 are consecutive or 8,9,2 are consecutive.
  + We have a group of 53 people, including 22 US citizens, 15 Mexican citizens, and 27 Canadian citizens. Among them, 4 people have a dual US-Mexican citizenship, 5 have US-Canadian citizenship, and 6 have Canadian-Mexican citizenship. How many people have a triple citizenship?
  + Compute φ(440) (φ(n) is the Euler totient function).
  + Give the number of solutions of x+y+z = 30, for 4 ≤ x ≤ 14, 3 ≤ y ≤ 17, 10 ≤ z ≤ 25.
* Graphs
* Handshaking Lemma
* Euler tours
* Hamiltonian cycles
* Graph coloring