## CAP5515: Computational Molecular Biology - Homework 1

## Due at the beginning of the lecture on 02-05-2009.

 No late assignment will be accepted.Do the following 3 required problems, 10 pts each.
Problem 1. Prove or disprove the following: A $(d, k)$-disjunct matrix is a $k$-error-correcting $\bar{d}$-separable matrix.

Problem 2. When there are exactly $d$ positive clones with at most $k$ errors, we can use the $(d, k)$-disjunct matrix to identify these clones based on Theorem 6 (in the poolingDesigns.ppt file). However, if there are at most $d$ positive clones with at most $k$ errors, we do not know how many smallest one should be selected as discussed in class. Present a solution to solve this problem. (Hint: Can we test on $(d+k)$-disjunct or $(d+2 k)$-disjunct matrix (instead of $(d, k)$-disjunct)? You also need to show the decoding algorithm.)

Problem 3. Show that the minimum number of rows required for a d-disjunct matrix is at least $\min \left\{\binom{(d+2)}{2}, n\right\}$.

