

**Math 2865 Assignment #3**  
**Due: Nov 8<sup>th</sup> 2007**

- 1) How many permutations of the 26 letters are there that contain none of the sequences MATH, RUNS, FROM or JOE?
- 2) In how many ways can the integers 1 through 9 be permuted such that exactly four of the nine integers are in their natural positions?
- 3) Prove that  $D_n = (n-1)(D_{n-1} + D_{n-2})$  (We did a similar problem in the tutorial)
- 4) Determine the number of 10-combinations of the multiset  $S = \{3 \bullet a, 4 \bullet b, 5 \bullet c, 4 \bullet d\}$
- 5) Solve the recurrence relation  $a_n = 2a_{n-1} + 3a_{n-2}, n \geq 2$  given that  $a_0 = 0$  and  $a_1 = 8$
- 6) Solve the recurrence relation  $a_n = -6a_{n-1} - 9a_{n-2} + n^2 + 3n, n \geq 2$  with  $a_0 = \frac{179}{128}, a_1 = -\frac{21}{128}$  (Hint: This is a non-homogeneous recurrence relation, so it involves two types of solutions, general ( $q_n$ ) and particular ( $p_n$ ). The final solution is the addition of the two. For the general solution, ignore  $n^2 + 3n$  term and solve the relation just like you would the previous problem, and the particular solutions has to be of the same type as  $f(n) = n^2 + 3n$ . Read sections 7.2 and 7.3 of the text and the notes from tutorial)