Math 228 **Homework 5** Due: Wed February 29, 2012

Instructions: Complete the homework problems below on a *separate* sheet of paper (and not all jammed up between the questions). Each solution should be accompanied with supporting work or an explanation why the solution is correct. Your work will be graded on correctness as well as the clarity of your explanations.

(4pts) 1. Solve the recurrence relation $a_n = a_{n-1} + 3$ using telescoping or iteration. Show your work.

(6pts) 2. Let a_n be the number of $1 \times n$ tile designs can you make using 1×1 tiles available in 4 colors and 1×2 tiles available in 5 colors.

(a) First, find a recurrence relation to describe the problem.

(b) Write out the first 6 terms of the sequence $a_1, a_2, \ldots$.

(c) Solve the recurrence relation. That is, find a closed formula for a_n.

(5pts) 3. Consider the recurrence relation $a_n = 4a_{n-1} - 4a_{n-2}$.

(a) Find the general solution to the recurrence relation (beware the repeated root).

(b) Find the solution when $a_0 = 1$ and $a_1 = 2$.

(c) Find the solution when $a_0 = 1$ and $a_1 = 8$.

(5pts) 4. Prove, by mathematical induction, that $F_0 + F_1 + F_2 + \cdots + F_n = F_{n+2} - 1$, where F_n is the nth Fibonacci number ($F_0 = 0$, $F_1 = 1$ and $F_n = F_{n-1} + F_{n-2}$).