MA 308

Homework #5

Due Tuesday, February 22

1. Below are two sequences from spreadsheets represented by spreadsheet formulas. For each sequence, identify if the sequence is being described by an explicit formula or by a recursive formula, and express the formula in the conventional way with algebraic notation.

	n	Sequence #1	Sequence #2
	A	B	C
1	1	`=(3^(A1-1))+A1^3-1`	3
2	2	`=(3^(A2-1))+A2^3-1`	`=C1*(C1+1)/2-9`
3	3	`=(3^(A3-1))+A3^3-1`	`=C2*(C2+1)/2-9`
4	4	`=(3^(A4-1))+A4^3-1`	`=C3*(C3+1)/2-9`
5	5	`=(3^(A5-1))+A5^3-1`	`=C4*(C4+1)/2-9`
6	6	`=(3^(A6-1))+A6^3-1`	`=C5*(C5+1)/2-9`
7	7	`=(3^(A7-1))+A7^3-1`	`=C6*(C6+1)/2-9`
8	8	`=(3^(A8-1))+A8^3-1`	`=C7*(C7+1)/2-9`
9	9	`=(3^(A9-1))+A9^3-1`	`=C8*(C8+1)/2-9`

2. Create a spreadsheet, like the previous problem, for the following two sequences. In each case, provide a printout of the sequence itself from the spreadsheet, and *also* use `Ctrl-~` to display the formulas, and print that out as well.

   (a) The Fibonacci numbers, described by a recursive formula.

   (b) The sequence $f(n) = \frac{n(n-1)}{2} + n + 1$. (This sequence came from our earlier problem of cutting the plane with lines.)

3. Problem 1.3, parts A, B, C, and D, pages 8–9 of the handout *Say it With Symbols*.

4. A large wooden $5 \times 5 \times 5$ cube is made up of 125 small plain unpainted cubes. Then the large cube is painted red. As a result, some of the small cubes have paint on 3 faces, some on 2 faces, some on 1 face, and some have no paint at all.

   (a) How many of each type of small cubes are there? Explain your answers.

   (b) Now answer the same question if the large cube is made up of $n \times n \times n$ small cubes. Again, justify your answers.