## Math 475 Homework 7

Due April 15th, 2009

1. Find a quadratic function that models this data:

| IN | OUT |
| :---: | :---: |
| 0 | -6 |
| 1 | -1 |
| 2 | -6 |
| 3 | -21 |
| 4 | -46 |
| 5 | -81 |

2. Prove that the first difference of an $N$ th degree polynomial has at most degree $N-1$.
3. Prove an $N$ th degree polynomial has constant $N$ th differences. (Hint: use the last answer.)
4. The $n$th tetrahedral number is the sum of the first $n$ triangular numbers. (It's also the balls in first $n$ layers of a tetrahedral ball pyramid.) Find a closed formula for it using our analysis of functions and their first, second, third, etc. differences.
5. Write me a formula for sums of cubes using our difference table analysis.
6. Derive our class solution for $x^{2}+B x+C=0$, then explain how you can solve ANY quadratic equation using this special case and derive the Quadratic Formula.
