Name: _____
Period: _____

5.6 Difference Tables and Polynomial Functions

Goal: Determine how certain patterns in difference tables generate different polynomial functions.

Take the following closed form equations and generate difference tables for each of them. In some cases it will be beneficial to find the 2nd differences (the differences of the differences).

Patterns of 1st degree or linear equations

1. $f(x) = 2x - 4$

x	f(x)	Δ
0		
1		
2		
3		
4		
5		
6		

2. $g(x) = -3x + 2$

x	g(x)	Δ
0		
1		
2		
3		
4		
5		
6		

3. $h(x) = x - 3$

x	h(x)	Δ
0		
1		
2		
3		
4		
5		
6		

4. Based on your results from above, describe the pattern that is consistent in all linear function difference tables.

5. Describe the process that can be used to generate a closed form equation using the patterns and values that appear in a difference table.

Name: _____
Period: _____

Patterns of 2nd degree or quadratic equations

6. $f(x) = x^2 + 3x - 2$ 7. $g(x) = 3x^2 - 4x + 5$ 8. $h(x) = 4x^2 + 3$

x	f(x)	Δ	Δ^2
0			
1			
2			
3			
4			
5			
6			

x	g(x)	Δ	Δ^2
0			
1			
2			
3			
4			
5			
6			

x	h(x)	Δ	Δ^2
0			
1			
2			
3			
4			
5			
6			

9. Based on your results from above, describe at least two patterns that arise in all quadratic function difference tables. (Hint: Pay close attention to the leading coefficient)

10. Try to formulate an algorithm or process that you could use to determine a closed form equation for any 2nd degree polynomial.

11. All quadratic equations can be expressed as $y = ax^2 + bx + c$. The points (1,12), (2,20), and (3, 30) satisfy the equation. Set up a system of equations that would allow you to solve for the coefficients *a, b*, and *c* and determine the closed form of the equation.

12. Write a 3rd degree polynomial function and set up a difference table. What is the pattern that will result for this, and all 3rd degree polynomial functions?