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 Date: 8/13/13 Period: D

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Analysis H  
 Chapter 1 Quiz 1  
**CALCULATORS OK**

1. Simplify each expression. Write your answer as an exponent or as a binomial coefficient (not the actual number).

a.  $\binom{67}{0} + \binom{67}{1} + \binom{67}{2} + \binom{67}{3} + \dots + \binom{67}{67} = 2^{67}$  ✓

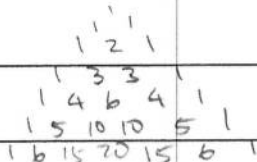
b.  $\binom{824}{0} + \binom{824}{2} + \binom{824}{4} + \binom{824}{6} + \dots + \binom{824}{824} = 2^{823}$  ✓

c.  $\binom{4}{4} + \binom{5}{4} + \binom{6}{4} + \binom{7}{4} + \dots + \binom{379}{4} = \binom{380}{5}$  ✓

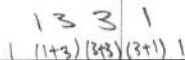
2. Write an explanatory proof about EITHER (a) or (c) from #1, for **why** the pattern works in general. Your proof must include words along with mathematical symbols. You may choose to include drawings as well.

Proof for part (circle one): (a) c

For a given number  $n$ ,  $\binom{n}{0} + \binom{n}{1} + \binom{n}{2} + \dots + \binom{n}{n-1} + \binom{n}{n}$  will always be equal to  $2^n$ .



In the Pascal's triangle, it starts with row 0, a single '1'. As you go down the rows, the sum of each row is double the sum of the previous row. This is because every number in a row will be summed twice to get the next row.



The sum of row three is  $1+3+3+1$ . The sum of the next row would then be  $1+1+3+3+3+3+1+1$ , which is double the amount of  $1+3+3+1$ . If row 0 adds up to 1, row 1 adds up to 2, row 2 adds up to 4, and so on, then each row would have a sum of  $2^n$ . Row 67 would have the sum of  $2^{67}$ .

Don't just give an answer - show me how you arrived at the answer, along with any computations (even though you can use your calculator).

1				2			
2			4	6			
3		8	10	12			
4	14	16	18	20			
5	22	24	26	28	30		
6	32	34	36	38	40	42	
7	44	46	48	<del>50</del>	52	54	56

$$53^2 + 1 = 2810$$
$$n^2 - n + 2$$
$$912^2 - 912 + 2 = 830834$$

1, 2, 3, 5, 8, 13, 21, 34, ~~55~~

$$F_9 = 3F_4 + 5F_5$$
$$t = 321$$

-2

~~12~~