

1. Examine the following pattern of numbers. The last row shown is the 4<sup>th</sup> row. The middle term of the  $n$ th (when  $n$  is an odd number) row can be found by the formula  $M(n) = 2n^2 + 5$ .

		7		
	11		15	
	19	23	27	
31	35	39	43	

- a) Write in the 5<sup>th</sup> row of the triangle. [3]
- b) What is the first term of the 8<sup>th</sup> row? Show how you arrived at your answer. [3]
- c) Find an expression for the first term of the  $n$ th row. [3]

2. Fill in the blanks. [3 pts per problem]

a)  $F_{25} = \underline{\hspace{1cm}} F_{21} + \underline{\hspace{1cm}} F_{20}$

b)  $F_{232} = F_{233} - F_{\underline{\hspace{1cm}}}$

c)  $F_{17} + 2F_{18} + F_{19} + F_{20} = F_{\underline{\hspace{1cm}}}$



2. Simplify each. Write your answer as a single term or binomial coefficient (choose number) [3 pts for (a) - (c), 5 pts for (d)]

a)  $\binom{47}{4} + 2\binom{47}{5} + \binom{47}{6} =$

b)  $\binom{61}{61} + \binom{62}{61} + \binom{63}{61} + \dots + \binom{77}{61} =$

c)  $\binom{86}{0} - \binom{86}{1} + \binom{86}{2} - \binom{86}{3} + \dots + \binom{86}{86} =$

d) Use words, diagrams, and/or math expressions to explain the pattern found in (b) OR (c) above (How do you know that this pattern works?). First, indicate which pattern you're explaining.

This is an explanation for (CIRCLE ONE)

(b)

(c)

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