Analysis H – Deggeller / Hahn/Gleason 18-19 Welcome to Pascalifornia!_____
Unit 1, Quiz 1 – ATPS [30 pts] Period: _____
NO CALCULATORS, but feel free to leave answers unsimplified.

1. Consider the odd number triangle we studied in class, starting with row 1.

1
3 5
7 9 11
13 15 17 19

a) Name the middle term of the 55th row. _____ [2]

b) **How many** terms (total) are in the first 9 rows of the triangle? _____ [3]

c) In class we proved that the first term of the nth row is $n^2 - n + 1$. Knowing this, find an expression for the last term of the nth row. [3]

2. Fill in the blanks. [3 each]

a) $F_{25} = \_\_ F_{20} + \_\_ F_{19}$

b) $F_{217} = F\_\_ - F\_\_$ *or* $F\_\_ - F\_\_$

3. Briefly explain the relationship between the Fibonacci Numbers and the Golden Ratio using words, mathematical symbols and/or pictures. [3]

4. Evaluate each, leaving your answer in terms of choose numbers or whole numbers [3 each]

a) $\binom{142}{35}+\binom{142}{36}=$ _____

b) $\binom{n}{1}+\binom{n}{3}+\binom{n}{5}+\ldots+\binom{n}{n}=$ _____

(assume n is an odd number bigger than 5)

c) $\binom{42}{40}+\binom{43}{40}+\binom{44}{40}+\ldots\ldots\binom{104}{40}=$ _____

5. **Choose 1 of the following 2 problems to do. Circle the problem you want me to grade.** [4]

a) Find a compact (simplified) expression for the sum of the first n Fibonacci numbers.

OR

b) There is a family of numbers called pentagonal numbers, the first 6 of which are:

1, 5, 12, 22, 35, 51..... Find an expression for the nth pentagonal number.