SchoolNova, Math 5b
Homework 3
Number Patterns and Fractions
September 30, 2018

Please provide sufficient details about how you solved the problem. More difficult problems are marked with a *. If unable to solve a problem, please present your thoughts and partial solution.

1. The sum of the first twenty-five numbers is 325:

   $1 + 2 + 3 + 4 \ldots + 24 + 25 \;=\; 325.$

   What is the sum of the next twenty-five numbers?

   $26 + 27 + 28 + \ldots + 49 + 50 \;= ?$

2. What is the sum of the odd numbers $1 + 3 + 5 + \ldots + 21 \;= ?$ Can you find a pattern to sum up the first n odd numbers?

3. $1^2 + 2^2 + 3^2 + \ldots + 25^2 \;=\; 5525$ and

   $2^2 + 4^2 + 6^2 + \ldots + 50^2 \;=\; N.$

   Find the value of N.

4. Alice started a Math Club during the first week of school. As the only member, she decided to recruit two new members during the following week of school. Each new member, recruits two new members in the week following their joining. How many members will the club have after five weeks?

5. Express the following as a simple fraction in lowest terms:

$$\frac{1}{2+\frac{1}{2}} + \frac{1}{3+\frac{1}{2}}$$

   .

6. $*$ Evaluate the following continued fraction:

$$3 + \frac{1}{7 + \frac{1}{15 + \frac{1}{1 + \frac{1}{292}}}}$$

   .

7. When the same whole number is added to both the numerator and denominator of 2/5, the value of the new fraction is 2/3. What number was added to both the numerator and the denominator?

8. Tom multiplied a number by $2\frac{1}{2}$ and got 50 as an answer. However, he should have divided the number by $2\frac{1}{2}$ to get the correct answer, What is the correct answer?

9.* List the integers $100!$, 100^{100}, 2^{100} and $(50!)^2$ in order of increasing size. Explain your answer.