Intermediate Math Circles
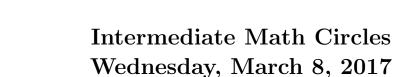# Wednesday, March 8, 2017
Problem Set 5

1. What is the smallest positive integer x for which

$$\sum_{i=1}^{100} ix$$

   is a perfect square?

2. Consider a sequence where $t_k = 3^k - 2k + 2$. Calculate $\sum_{k=1}^{n} t_k$.

3. In a geometric sequence, the first term is 7, the last term is 448, and the sum is 889. Find the third term.

4. The sum of the first n terms of a sequence is $n(n+1)(n+2)$. What is the 10th term of the sequence?

5. Evaluate the sum $\sum_{i=1}^{28} \left[\frac{1}{i} - \frac{1}{i+2} \right]$

6. Find $9 + 99 + 999 + 9999 + \ldots$ to n terms.