In class on Thursday we discussed how knowing the form (equation) of the \( n^{th} \) term of an arithmetic sequence can make it easier to quickly determine the value of a term indexed by (the subscript part of \( a_n \)) a large number. To refresh your memory, let us look at a quick example. Suppose we have the sequence 2, 6, 10,... and we want to find the 347\( ^{th} \) term of the sequence. Well, we know that (in the same fashion as Thursday’s notes) in this example \( a = 2 \) and \( d = 4 \). Moreover, we can see that

\[
\begin{align*}
    a_1 &= a = 2 \\
    a_2 &= a_1 + 4 = 6 = a + d \\
    a_3 &= a_2 + 4 = 10 = a + 2d \\
    & \vdots \\
    a_n &= a_{n-1} + 4 = a + (n - 1)d.
\end{align*}
\]

Thus, if we want to know the 347\( ^{th} \) term of this sequence, we simply use the last equation with \( n = 347 \):

\[
    a_{347} = a + 346d = 2 + 346(4) = 2 + 1384 = 1386.
\]

Clearly this is a lot easier than finding the first 346 terms by hand!

For the following 4 sequences, find \( a, d \), and the term indicated (clearly show all work and turn in a well-organized set of solutions):

1. 7, 11, 15, 19,...; The 48\( ^{th} \) term
2. 11, 13, 15,...; The 1023\( ^{rd} \) term
3. 1, 9, 17,...; The 321\( ^{st} \) term
4. 33, 103, 173,...; The 14\( ^{th} \) term.