

## Risp 20: When does $S_n = u_n$ ?

Given the sequence  $u_1, u_2, u_3, \dots$ ,  
let's say the sum of the first  $n$  terms is  $S_n$ .

Consider the sequence  $11, 9, 7, 5, \dots$

When does  $S_n = u_n$  for this sequence?

Find all values of  $n$  so that this is true.

Still with arithmetic sequences:

If you pick any natural number  $n$ , and any first term  $a$ ,  
can you always find a common difference  $d$   
so that  $S_n = u_n$ ?

If you pick any natural number  $n$ ,  
and any common difference  $d$ ,  
can you always find a first term  $a$  so that  $S_n = u_n$ ?

What if we look at the geometric sequence  
defined by its first term  $a$  and its common ratio  $r$ ?  
When does  $S_n = u_n$  here?

Experiment with other sequences/series:  
when can  $S_n = u_n$ ?  
What if  $u_n$  is periodic?

Try the Fibonacci.

What happens if you run this sequence backwards?

What if  $u_n$  is a polynomial function of  $n$ ?