

Math 428, Sixth worksheet, 10/9/17

This is an extension of homework problem 2; I decided to make it a worksheet rather than an assignment.

For an integer  $k \geq 1$ , compute the continued fraction expansion for

$$\frac{(2k+1)^2}{(2k)^2} = \frac{4k^2 + 4k + 1}{4k^2} = 1 + \frac{1}{\frac{4k^2}{4k+1}} = \dots$$

and use it, together with the general formula for the Stern sequence to find  $n = n_k$  so that

$$\frac{s(n_k)}{s(n_k + 1)} = \frac{(2k+1)^2}{(2k)^2}.$$

Hints: there will be five denominators in the continued fraction for  $2k \geq 4$ , and these will either be constant, or linear in  $k$ . And,  $(n_k/2^{2k})$  is a convergent sequence.

I will leave the case  $\frac{(2k+2)^2}{(2k+1)^2}$  for the next assignment!