## Homework 13 due May 2

- 1. Find the limit of each sequence, and prove the result is correct
  - (a)  $\lim_{n \to \infty} \frac{3n+5}{2n+1};$ (b)  $\lim_{n \to \infty} \left(\sqrt{n+5} - \sqrt{n}\right).$
- 2. Argue that the sequence

$$1, 0, 1, 0, 0, 1, 0, 0, 0, 1, \dots$$

does not converge to 1.

- 3. Suppose that for a particular  $\epsilon > 0$  we have found a suitable value of N that "works" for a given sequence.
  - (a) Then, any larger/ smaller (pick one!) N will also work for the same  $\epsilon > 0$ . Please explain.
  - (b) Then, this same N will also work for any lager/smaller (pick one!) value of  $\epsilon$ . Please explain.
- 4. Imitate the logical structure of the definition of a limit to create a rigorous definition for the mathematical statement  $\lim_{n\to\infty} a_n = \infty$ . Use your definition to show that  $\lim_{n\to\infty} \sqrt{n} = \infty$