# Recursive Roots

Let $a_1 = 1$ and $a_{n+1} = \sqrt{a_n + 6}$.

1. Use induction to prove $a_n$ is increasing.

2. Explain why $a_n$ is bounded below.

3. Use induction to prove $a_n$ is bounded above. Hint: $\{a_n\} \approx \{2., 2.828, 2.971, 2.995, \ldots\}$.

4. Cite a theorem (and explain why it applies) to prove $\lim_{n\to\infty} a_n$ exists.

5. Find $\lim_{n\to\infty} a_n$.