1. Consider the sequence:

\[ a_1 = \sqrt{3}, \quad a_2 = \sqrt{3 + 2\sqrt{3}}, \quad a_3 = \sqrt{3 + 2\sqrt{3 + 2\sqrt{3}}}, \quad a_4 = \sqrt{3 + 2\sqrt{3 + 2\sqrt{3 + 2\sqrt{3}}}}, \quad \ldots \]

(a) Find a recursion formula for \( a_{n+1} \).

(b) Use induction to prove that \( 0 \leq a_n \leq 3 \), for all \( n \geq 1 \).

(c) Use induction to prove that the sequence \( \{a_n\} \) is increasing.

(d) By (b) and (c) it follows that the sequence is convergent (why?). Find its limit.