

MATH 140A Review: Mathematical Induction

1. Show that $6 \mid (11^n - 5^n)$ for $n = 1, 2, \dots$

2. Consider the sequence defined by

$$a_1 = 2 \quad \text{and} \quad a_{n+1} = 2^{a_n} \text{ for } n \geq 1.$$

Show that $a_n \leq a_{n+1}$ for $n = 1, 2, 3, \dots$

3. Consider the sequence defined by

$$a_1 = \sqrt{3} \quad \text{and} \quad a_{n+1} = \sqrt{a_n} \text{ for } n \geq 1.$$

Show that $a_n \geq a_{n+1}$ for $n = 1, 2, 3, \dots$