

Section 7.1 Introduction to Recurrence Relations

2. Given the sequence 3, 6, 9, 15, 24, 39, ... notice that each number is the sum of the previous two entries. This means we will have two initial values and the sequence can be defined as follows:

$$a_n = a_{n-1} + a_{n-2} \text{ for } n \geq 3$$
$$a_1 = 3 \quad a_2 = 6$$

9. The recurrence relation is $A_n = (1.1)A_{n-1}$

10. The initial condition: $A_0 = 2000$.

11. $A_1 = 2200$; $A_2 = 2420$; $A_3 = 2662$.

12. $A_n = 2000 (1.1)^n$

33. See back of the book for the $n = 3$ case. The $n = 4$ case is very similar.

59. The problem with the proof as given in the book is that the recurrence relation is defined for $n \geq 3$. This means that the basis step would be $n = 3$, not $n = 1$ as given in the book. And if you check the real basis step, you will immediately see that the sequence is not equal to 1 for every $n \geq 1$.

Section 7.2 Solving Recurrence Relations

2. Not linear homogeneous (extra factor of n)

5. and 8. These ones are linear homogeneous.

16. $a_n = 3 \cdot 2^n + 2 \cdot 5^n$

17. $a_n = 3 \cdot 4^n + 1 \cdot (-2)^n = 3 \cdot 4^n + (-2)^n$

22. $a_n = 2 \cdot \left(\frac{1}{3}\right)^n + 9 \cdot n \cdot \left(\frac{1}{3}\right)^n$

34. $a_n = \left(\frac{2}{3} \cdot 2^n + \frac{1}{3} \cdot (-1)^n\right)^2$