ECE335 Summer 2019 - Lecture 17 Examples

Example 1: Find a closed form formula for

$$a_1 = 1$$
$$a_{n+1} = 3a_n + 1$$

and prove it is correct using induction.

Expand the first few terms of the recursion to identify a pattern, then derive a formula for the pattern.

Proof By Induction

Step 1: Write the induction given closed form for n

Step 2: Show the induction given is true for a base case

Step 3: Write the induction goal closed form for $n + 1$

Step 4: Assume the induction formula from step 1 is true and substitute the closed form solution into step 3

Step 5: Perform any necessary algebra to show the closed form solution from step 3 for $n + 1$

Example 2: Find a closed form formula for

$$a_0 = 1$$
$$a_{n+1} = a_n + 2$$

and prove it is correct using induction.

Expand the first few terms of the recursion to identify a pattern, then derive a formula for the pattern.

Proof By Induction

Step 1: Write the induction given closed form for n

Step 2: Show the induction given is true for a base case

Step 3: Write the induction goal closed form for $n + 1$

Step 4: Assume the induction formula from step 1 is true and substitute the closed form solution into step 3

Step 5: Perform any necessary algebra to show the closed form solution from step 3 for $n + 1$