

## ECE335 Summer 2019 - Lecture 16 Examples

**Example 1:** Prove that for  $x \neq 1$ ,  $1 + x + x^2 + \dots + x^n = \frac{x^{n+1}-1}{x-1}$ .

*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:** Prove that for  $n \geq 1$ ,  $1 + 3 + 5 + \dots (2n - 1) = \sum_{i=1}^n (2i - 1) = n^2$ .

*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  $n + 1$