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CS200

Midterm #2 Question 12 proof

We will prove “that is divisible by 3 for all non-negative integers n” by induction on n.

Base case: n = 0: which equals 0 and . Therefore, the base case holds.

Inductive hypothesis: n > 0 or n+1: is divisible by 3. We can simplify the expression by multiplying out to get which we can expand further to get . Finally, we can simplify this expression to get . We have already proven that is divisible by 3 and because , the expression is divisible by 3.

Conclusion: Because we have proven that is divisible by 3 when n = 0 at the base case and when n = n +1 in the recursive case, we have proven “that is divisible by 3 for all non-negative integers n” by induction on n.