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CSIS 213-3941

Assignment 7&8 Quiz Part 2

**Question 2**

Prove this statement by mathematical induction:

7n− 1 is divisible by 6, for each integer n ≥ 0.

**Proof:**

Let the property P(n) be the sentence “7n− 1 is divisible by 6, for each integer n ≥ 0.”

7n− 1 is divisible by 6, for each integer n ≥ 0

***Show that P(0) is true:***

To establish P(0), we must show that

70 – 1 is divisible by 6

But

1 – 1 = 0

And 0 is divisible by 6 because 0 = 0 \* 6. Hence P(0) is true.

***Show that for all integers k >= 0, if P(k) is true then P(k + 1) is also true:***

*[Suppose that P(k) is true for a particular but arbitrarily chosen integer k >= 0.]*

Let k be any integer with k >= 0, and suppose that

7k – 1 is divisible by 6

By definition of divisibility, this means that

7k – 1 = 6r for some integer r

We must show that

7(k+1) – 1 is divisible by 6

But

7(k+1) – 1 = 7k \* 71 – 1

= 7k \* 7 – 1

= (7k – 1) \* 6

Because 7k – 1 is already proven to be true and 6 is divisible by 6 because 6 \* 1 = 6. P(k) and P(k + 1) are true.