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CSIS 213-3941

Exam 2 Part 2

**Question 2**

Let d0, d1, d2, . . . be defined by the formula dn = 3n - 2n for all integers n ≥ 0. Show that this sequence satisfies the recurrence relation

dk = 5dk−1 - 6dk−2.

**Proof:**

By definition of d0, d1, d2, . . . , dn = 3n - 2n for all integers n ≥ 0. Substitute *k*, *k* – 1, and *k* - 2in place of *n* to get

dk = 3k – 2k

dk - 1 = 3k-1 – 2k-1

dk - 2 = 3k-2 – 2k-2

for all integers k ≥ 2. Then,

dk = 5dk−1 - 6dk−2

3k – 2k = 5(3k-1 – 2k-1) – 6(3k-2 – 2k-2)

3k – 2k = (15k-1 – 10k-1) – (18k-2 – 12k-2)

3k – 2k = (15k-1 - 18k-2) – (10k-1 + 12k-2)

3k – 2k = 3k – 2k