

## Inductive Proof

$$a(0) = 1, d = 2$$

$$a(1) = 1 + 2 = 3 = a(0) + 2$$

$$a(2) = 3 + 2 = 5 = a(1) + 2 = ((a(0) + 2) + 2) + 2$$

$$a(n) = a(0) + 2n$$

**Prove:**

$$a(n) = a(n - 1) + 2 = a(0) + 2n$$

**Base Case (usually the recursive**

$$a(0) = a(0) + 2(0)$$

$$a(0) = a(0)$$

**Hypothesis:**

$$a(k) = a(k - 1) + 2 = a(0) + 2k \text{ is TRUE}$$

$$a(0) = 1$$

for  $k \geq 0$

**Proof:**

$$a(k + 1) = a(k + 1 - 1) + 2 = a(0) + 2(k + 1)$$

$$a(k + 1) = a(k) + 2 = a(0) + 2k + 2$$

$$a(0) + 2k + 2 = a(0) + 2k + 2$$

## Second Proof

**Prove:**

$$a(n) = a(n - 1) \cdot r = a(0) \cdot r^n$$

**Base Case**

$$n = 0$$

$$a(0) = a(0) \cdot r^0$$

**Hypothesis**

$$a(k) = a(k - 1) \cdot r = a(0) \cdot r^k \text{ is TRUE}$$

for  $k \geq 0$

**Proof:**

$$a(k + 1) = a(k + 1 - 1) \cdot r = a(0) \cdot r^{k+1}$$

$$a(k + 1) = a(k) \cdot r = a(0) \cdot r^{k+1}$$

$$a(k + 1) = a(0) \cdot r^k \cdot r = a(0) \cdot r^{k+1}$$

$$a(k + 1) = a(0) \cdot r^{k+1} = a(0) \cdot r^{k+1}$$