1. Given $a_n = 2a_{n-1} + 2^n$ where $a_0 = 0;$ for $n > 0.$ Prove $a_n = n2^n$ for $n \geq 0.$
   a. B/C: If $a_n = 2a_{n-1} + 2^n = n2^n$, then a_0 must equal 0.
      $a_0 = 0 \times 2^0$
      $a_0 = 0 \times 1$
      $a_0 = 0$ *Proven.*
   b. I/S: Let $n = k$ and, therefore, $k \geq 0$. Suppose $a_k = 2a_{k-1} + 2^k = k2^k$.
      $a_{k+1} = 2a_k + 2^{k+1}$
      $a_{k+1} = 2 \times k2^k + 2^{k+1}$
      $a_{k+1} = k2^{k+1} + 2^{k+1}$
      $a_{k+1} = (k+1)2^{k+1}$ *Proven for k+1.*

2. Given $b_n = 4b_{n-2}$ where $b_0 = 1$ and $b_1 = 6.$ Prove $b_n = 2^{n+1} - (-2)^n$ for $n \geq 0.$
   a. B/C: If $b_n = 4b_{n-2} = 2^{n+1} - (-2)^n$, then b_0 must equal 1 and b_1 must equal 6.
      $b_0 = 2^{0+1} - (-2)^0$
      $b_0 = 2^1 - (-2)^0$
      $b_0 = 2 - 1$
      $b_0 = 1$ *Proven.*
      $b_1 = 2^{1+1} - (-2)^1$
      $b_1 = 2^2 - (-2)^1$
      $b_1 = 4 - -2$
      $b_1 = 6$ *Proven.*
   b. I/S: Let $n = k$ and $k \geq 0$. Suppose $b_n = 4b_{n-2} = 2^{n+1} - (-2)^n$ for $n = 0,1,\ldots,k$.
      $b_k = 4b_{k-2}$
      $b_k = 4 \times (2^{k-2+1} - (-2)^{k-2})$
      $b_k = 2^2 \times (2^{k-1} - (-2)^{k-2})$
      $b_k = 2^{k-1+2} - (-2)^{k-2+2}$
      $b_k = 2^{k+1} - (-2)^k$ *Proven for k.*
      $b_{k+1} = 4b_{k+1-2}$
      $b_{k+1} = 4b_{k-1}$
      $b_{k+1} = 4 \times (2^{k-1+1} - (-2)^{k-1})$
      $b_{k+1} = 2^2 \times (2^k - (-2)^{k-1)}$
      $b_{k+1} = 2^{k+2} - (-2)^{k-1+2}$
      $b_{k+1} = 2^{k+2} - (-2)^{k+1}$ *Proven for k + 1.*