Assignment #8

Due Friday, 12 November 2010

1. Let the half-life of a certain radioactive element $X$ be 1 hour. Suppose you begin with 20 grams of $X$ but at the end of each hour you add an additional 8 grams of $X$. How many grams of $X$ do you have at the end of $n$ hours?

2. Solve the following second-order linear recurrence relations:
   
   (a) $a_0 = 2$, $a_1 = 9$, and, for $n \geq 2$, $4a_n = 12a_{n-1} - 9a_{n-2}$.

   (b) $a_0 = 5$, $a_1 = 8$, and, for $n \geq 2$, $a_n = 8a_{n-1} - 25a_{n-2}$.
3. In how many ways can I climb a staircase with \( n \) stairs if each time I take a step I can cover either 1 or 2 stairs?
4. If I have $1 \times 1$ tiles in three colors (red, white, and blue) and $2 \times 1$ tiles in 4 colors (yellow, purple, gold, and brown), then in how many ways can I create an $n \times 1$ tiling?