Name: _____

Entry number: _____

There are 2 questions for a total of 10 points.

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1. (5 points) Consider the following problem from Minor-2. Consider the recursive function:

   F(n)
      - If $(n > 1)$\{
         - F($\lfloor \frac{n}{3} \rfloor$)
         - F($\lfloor \frac{n}{3} \rfloor$)
      \}
      - Print("Hello World")

   Let $R(n)$ denote the number of times this function prints "Hello World" given the positive integer n as input. Give a closed form expression for $R(n)$ in terms of n. Prove correctness of the expression that you obtain.

2. (5 points) For this problem, we first need to define the concept of tiling a grid with triminoes. Consider an infinite supply of "L" shaped *triminoes* and an $m \times n$ grid pattern with some grid cells marked with a cross. Such a grid is said to be "tileable" using the triminoes iff it is possible to place one layer of triminoes on the grid such that all grid cells except the ones marked with cross are covered and no part of any trimino is outside the grid. The figure below illustrates this concept.

Grid Tileable (showing possible tiling)   Grid not Tileable
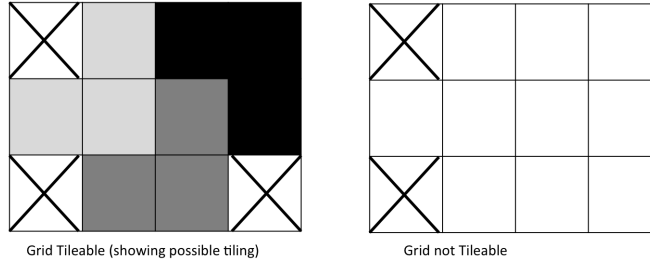
<u>Prove or disprove</u>: For all $n \geq 2$, any $2^n \times 2^n$ grid with precisely one grid cell marked with a cross is tileable using "L" shaped triminoes.