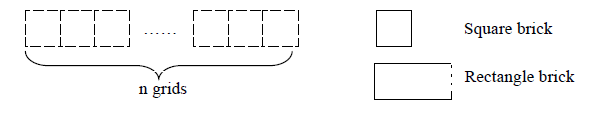
**HW W5-2**

**Name :** Sahand Sabour **Student ID:** 2020280401

1. **A worker is tiling a road with n square grids, there are two different kinds of bricks available, one is the square brick and the other is the rectangle brick which covers 2 grids. Please count the total different ways the road can be tiled.**

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Let denote the number of arrangement. We would consider 2 scenarios:

1. The first tile is filled with a square brick. In this case, n-1 grids would be left.
2. The first tile is filled with a rectangle brick, leaving n-2 grids to be filled.

Accordingly, we would consider these two scenarios for the remaining grids, which shows a recursive behavior in how the grids are filled. In order to fill in 1 grid, we would need 1 square brick, giving . For 2 grids, we can have 1 rectangle brick or 2 square bricks, giving . For 3 grids, we can use 3 square bricks, 1 rectangle brick and a square brick, or a square brick and a rectangle brick, , giving . Hence, assuming since the only way to tile 0 grids is by not placing any tiles, it can be observed that the number of ways to fill in the grids follow the Fibonacci sequence, with a shift in values corresponding to each index (i.e. . Therefore we have

Giving characteristic equation with roots and . Therefore, +, where

Solving the above equations results in and . Therefore,

+

Where is the number of ways to tile a road consisting of n grids.

1. **How many different ways to color n grids in a line with red, white or blue colors but no two adjacent grids are colored with red?**

Let denote the number of arrangement. There would be two scenarios:

1. The first grid and the third grid are colored with white. In this case, there would be a 1-1 correspondence between the arrangements of the 4th grid to nth grid and the arrangements for remaining n-2 grids: 2.
2. The first grid is white and the third grid is colored with either blue or red. In this case, there would be a 1-1 correspondence between the arrangements of the 3rd grid to nth grid and the arrangements for remaining n-1 grids: 2.

This gives =2+. Accordingly, and , and the characteristic equation with roots and .

Giving and . Therefore,