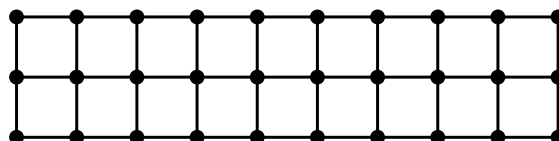# Spring 2010
Barge Problem 3

This problem has no title The corners of a $3 \times n$ grid are colored either red or white. Maybe a hamster is running through the grid, or maybe the hamster is just not in this problem.

A 3×10 grid, with black corners.

1. Is there a smallest value of n that guarantees the existence of a rectangle whose 4 corners have the same color? If so, find that value; if not, explain why no smallest n exists.

2. Repeat part 1, but now forming a square, all of whose 4 corners are the same color.

Now suppose you splurge and buy a $4 \times n$ grid. As before, each corner of the grid is colored black or white. Answer the same questions as before:
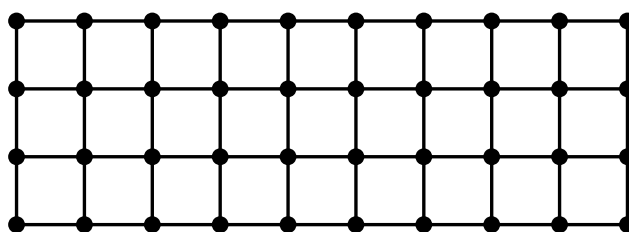
A 4×10 grid, with black corners.

3. Is there a smallest value of n that guarantees the existence of a rectangle whose 4 corners have the same color? If so, find that value; if not, explain why not.

4. Same question, for squares.

This question has lots of **part**s, so there is lots of opportunity for **part**ial credit.

Deadline: Saturday, Feb. 27 at 6:00 a.m.