

CMSC 752 Homework 11
Morally Due Tue April 22, 2025
Dead Cat April 24

1. (50 points) Show that every $\text{COL}: [11] \times [11] \rightarrow [3]$ there is a mono rectangle.

2. (50 points) The shape below is called a *Soren*. In a Soren the following pairs-of-points have the same distance apart:

1 and 2

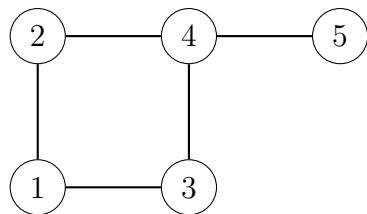
1 and 3

2 and 4

3 and 4

4 and 5.

Given a coloring, a *monochromatic Soren* is a Soren where all five vertices have the same color.



Show that there exists a number N such that, for all 2-colorings of $[N] \times [N]$ there exists a monochromatic Soren. You may assume the following:

For all c there exists $S = SQ(c)$ such that for all c -colorings of $[S] \times [S]$ there exists a monochromatic square (all four corners the same color.)