

Problem Set 2

Due: Monday, September 18, 2023 at noon

Problem 2.1 [$2 \times n$ edge-matching]. In Lecture 2, we saw a reduction from 3-Partition to edge-matching puzzles. Recall that an (unsigned) *edge-matching puzzle* consists of mn tiles, where each tile is a unit square whose sides are each labeled with a color. The goal is to place the mn given tiles into an $m \times n$ rectangle such that tiles match in color on shared edges.

Give a reduction from 3-Partition to show that edge-matching puzzles are NP-hard even when the following two conditions hold simultaneously:

- $m = 2$, i.e., the puzzle is $2 \times n$; and
- tiles cannot be rotated or flipped (only translated).