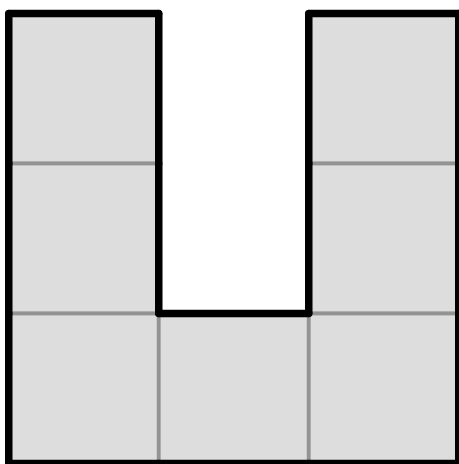


Problem Set 1 Solutions

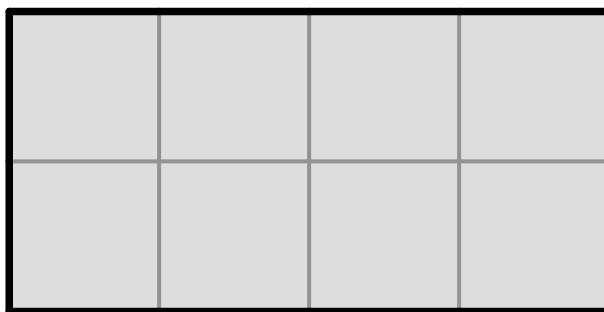
Due: Tuesday, February 11, 2025 at 10am

Problem 1.2 [Cube Folding]. Fold a unit cube from at least two of the four polyominoes in Figure 1. All foldings are possible in the half-grid model, where

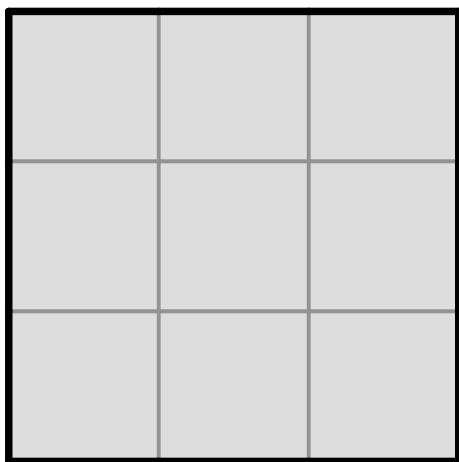
- creases are horizontal, vertical, or 45° diagonal lines;
- creases connect endpoints with half-integer coordinates; and
- creases are folded by $\pm 90^\circ$ or $\pm 180^\circ$.



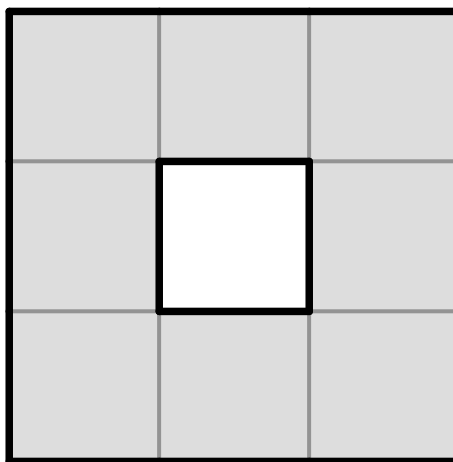
(a) U heptomino



(b) 2×4 octomino



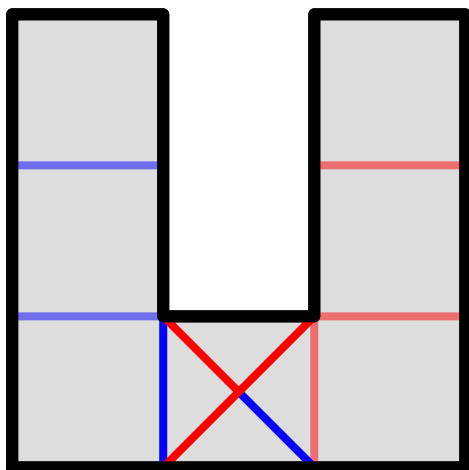
(c) 3×3 nonomino



(d) O octomino

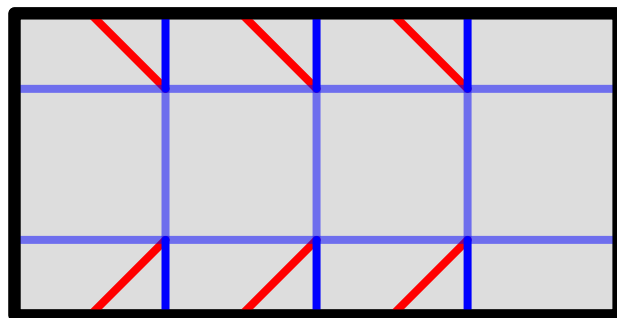
Figure 1: Fold at least two of these nets into a unit cube.

Figure 2 give the solution crease patterns. The creases follow Origami Simulator notation (and can be downloaded and simulated via <https://origamisimulator.org/>): mountains are red, and valleys are blue; lighter edges denote folds by 90° , while darker edges denote folds by 180° .



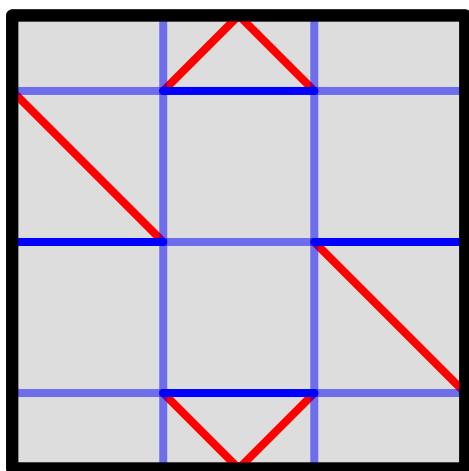
<https://courses.csail.mit.edu/6.5310/spring25/psets/ps1-solutions-a.svg>

(a) U heptomino. Based on Figure 6 of https://erikdemaine.org/papers/CubeFolding_CCCG2020/.



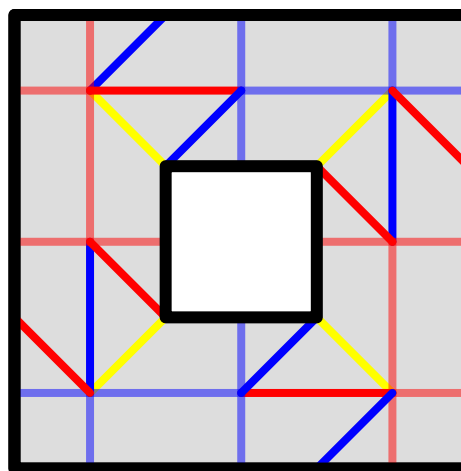
<https://courses.csail.mit.edu/6.5310/spring25/psets/ps1-solutions-b.svg>

(b) 2×4 octomino. Based on Figure 5 of https://erikdemaine.org/papers/CubeFolding_CCCG2020/.



<https://courses.csail.mit.edu/6.5310/spring25/psets/ps1-solutions-c.svg>

(c) 3×3 nonomino. Based on Figure 4 of https://erikdemaine.org/papers/CubeFolding_CCCG2020/.



<https://courses.csail.mit.edu/6.5310/spring25/psets/ps1-solutions-d.svg>

(d) O octomino. Discovered by Hayashi Layers using a computer search in a previous edition of this class.

Figure 2: Solution crease patterns.