

# Pentomino Pathfinding

Steven Nguyen (icecream17)

September 4, 2024

## 1 Introduction

[**deckard1**] posed the following problem: Consider an  $m \times n$  rectangular grid of squares. We want to place up to a set of twelve pentominoes (see Figure 1) and endpoints  $A$  and  $B$  on the grid such that the  $a(m, n) = \text{length of (the shortest path between } A \text{ and } B)$  is maximized.

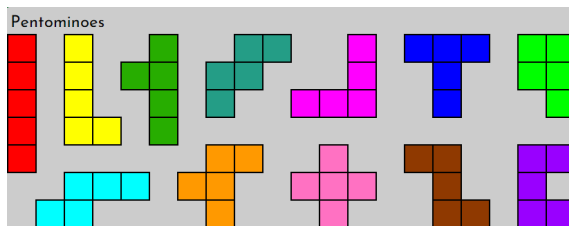


Figure 1: The twelve pentominoes [**sheet**]; from top left clockwise they are named I, L, Y, W, V, T, P, U, Z, X, F, N

## 2 Trivial square grids

### 2.1 1, 2, and 3

For 1 and 2,  $n \times n < 5$ , so no pentomino can fit:  $a(1) = 1, a(2) = 3$

|   |   |   |
|---|---|---|
|   |   | 3 |
| 1 | 1 | 2 |

For  $n=3$ , we have 9 squares and adding a pentomino would restrict the total squares to 4, so the length 5 path is optimal.

|   |   |   |
|---|---|---|
|   |   | 5 |
|   |   | 4 |
| 1 | 2 | 3 |