

Getting Started with Pavemat

Learn to create styled matrices with paths and highlights for mathematical concepts, data structures, and algorithms.

Step 1: Your First Pavemat

Let's start with a simple 3×3 matrix:

```
#import "@preview/pavemat:0.2.0": pavemat

#let matrix = $ mat(1, 2, 3; 4, 5, 6; 7, 8, 9) $
#pavemat(matrix)
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

This creates a basic matrix without styling—identical to a regular Typst matrix since we haven't added paths or fills.

Step 2: Adding Your First Path

Add a simple path using directional characters:

```
#pavemat(
  matrix,
  pave: "DD" // Move right twice
)
```

$$\begin{pmatrix} \bar{1} & \bar{2} & \bar{3} \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

The path "DD" draws a horizontal line from the top-left corner, moving right two steps.

Step 3: Understanding Direction Characters

Pavemat uses WASD gaming convention by default:

- W = Up 
- A = Left 
- S = Down 
- D = Right 

Try different path patterns:

```
// L-shaped path (right then down)
#pavemat(matrix, pave: "DDSS")
```

$$\begin{pmatrix} \bar{1} & \bar{2} & \bar{3} \\ 4 & 5 & \bar{6} \\ 7 & 8 & 9 \end{pmatrix}$$

```
// Complete border around the matrix
#pavemat(matrix, pave: "DDSSAAWW")
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

```
// Diagonal-like steps
#pavemat(matrix, pave: "DSDS")
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Step 4: Adding Cell Highlights

Add color to specific cells using position strings:

```
#pavemat(
  matrix,
  pave: "DSDS",
  fills: (
    "0-0": red.transparentize(80%), // Top-left cell
    "1-1": blue.transparentize(80%), // Center cell
    "2-2": green.transparentize(80%) // Bottom-right cell
  )
)
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Note: Position strings like "0-0" use (row, column) coordinates starting from 0.

Step 5: Understanding Fill Types

There are two types of fills:

- "x-y": Flood fill (fills connected regions)
- "[x-y]": Single cell fill (fills only that specific cell)

```
#pavemat(
  matrix,
  pave: "DDSS", // Creates barriers
  fills: (
    "0-0": red.transparentize(80%), // Flood fill from top-left
    "[2-2]": blue.transparentize(80%), // Only the bottom-right cell
  )
)
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Red fills the entire connected region; blue fills only the single specified cell.

Step 6: Styling Your Paths

Make paths more visually appealing:

```
#pavemat(
  matrix,
  pave: "DSDS",
  stroke: red + 2pt, // Red color, 2pt thickness
  fills: ("1-1": yellow.transparentize(80%))
)
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Step 7: Multiple Paths with Different Styles

Add multiple paths, each with its own style and starting position:

```
#pavemat(
  matrix,
  pave: (
    (path: "DD", stroke: red + 2pt), // Horizontal red
  line
    (path: "SS", from: "top-right", stroke: blue + 2pt), // Vertical blue
  line
    (path: "AA", from: "bottom-right", stroke: green + 2pt) // Horizontal green
  line
  )
)
```

$$\begin{pmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Step 8: Using Starting Positions

Paths start from top-left by default. Specify different starting points using named positions or coordinates:

```
#pavemat(  
  matrix,  
  pave: (  
    (path: "DDSS", from: "top-left", stroke: red + 1pt), // From corner  
    (path: "WASD", from: (1, 1), stroke: blue + 1pt) // From center grid  
  )  
  point  
)
```

$$\begin{pmatrix} \boxed{1} & \boxed{2} & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

Important: The from parameter uses grid coordinates (intersection points), not cell coordinates. For a 3×3 matrix, grid coordinates range from (0,0) to (3,3).

Step 9: Advanced Styling Within Paths

Change styles mid-path using inline style specifications:

```
#pavemat(  
  matrix,  
  pave: "D(Paint: red, thickness: 3pt)D(Paint: blue, dash: 'dotted')SS",  
  fills: ("" : gray.transparentize(95%))  
)
```

$$\begin{pmatrix} \boxed{1} & \boxed{2} & \boxed{3} \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{pmatrix}$$

This creates a path where the first segment is thick red, the second is dotted blue, with dotted style continuing.