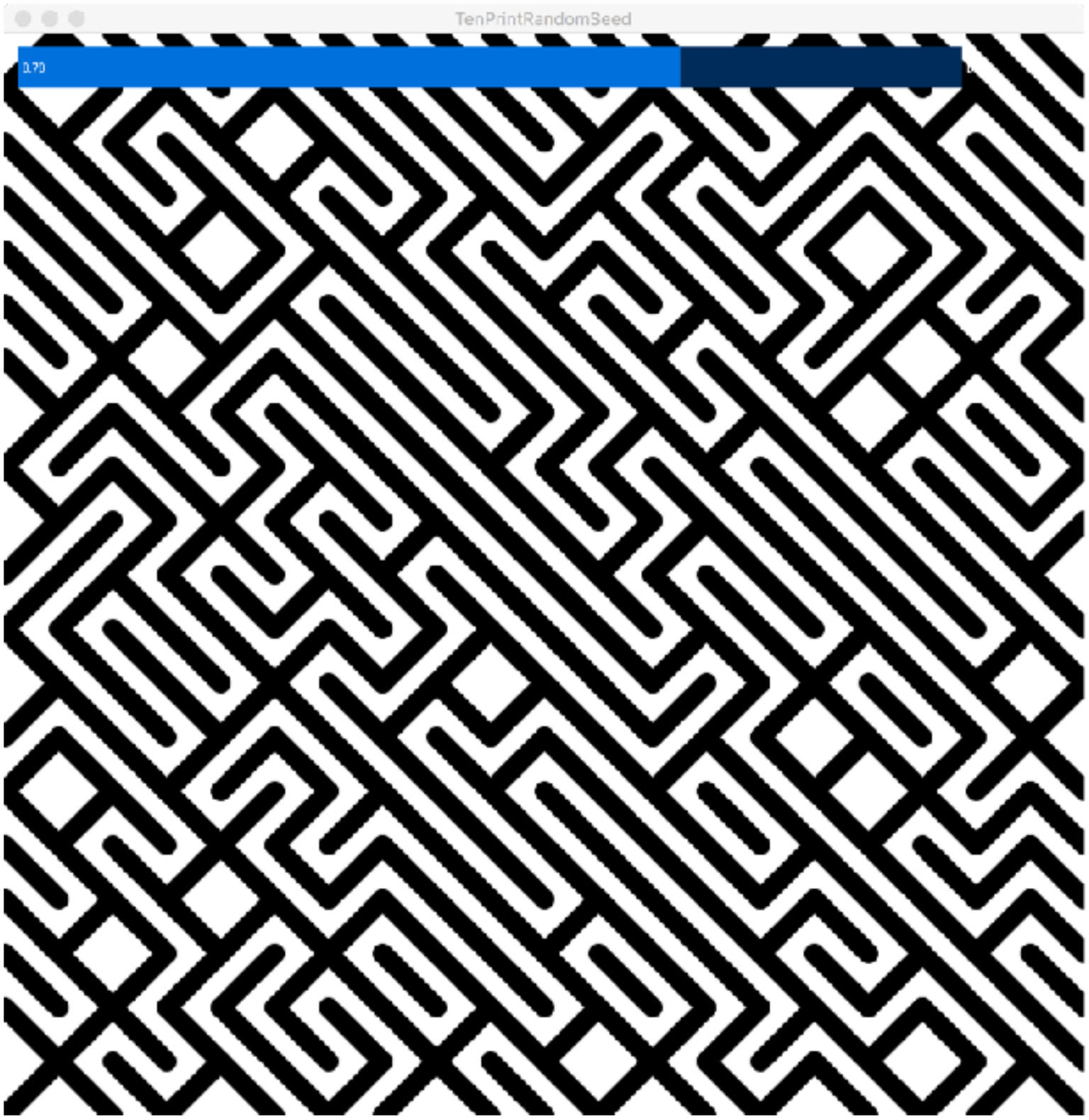
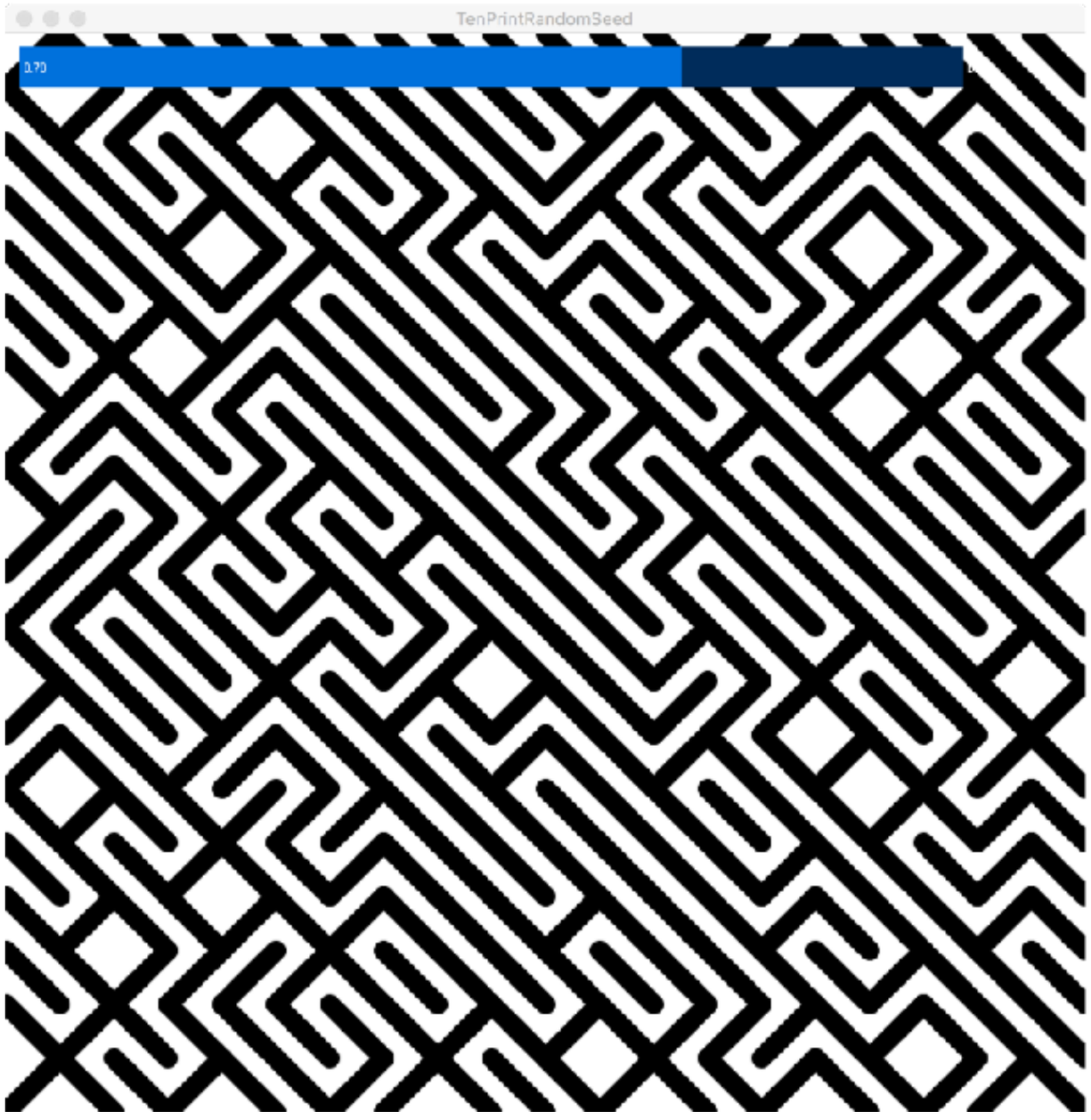
Module 09
Noise

Last week...



What's out here?



what about here?

and here?

Adding Direct Manipulation to 10 Print is easy:

- In `draw()`, use `translate()` inside a geometric context.
- User a `mouseDragged()` hook to control the amount of translation (by setting global variables).

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- In `draw()`, use `translate()` inside a geometric context.
- User a `mouseDragged()` hook to control the amount of translation (by setting global variables).

But there's no more pattern to see!

Workaround: just draw more of the pattern.

```
for ( int row = 0; row < 20; ++row ) {
  for ( int col = 0; col < 20; ++col ) {
    float x = col * 40;
    float y = row * 40;

    if ( random(1) < bias ) {
      // Draw a line from NW to SE
      line( x, y, x + 40, y + 40 );
    } else {
      // Draw a line from NE to SW
      line( x + 40, y, x, y + 40 );
    }
  }
}
```

Workaround: just draw more of the pattern.

```
for ( int row = -20; row < 40; ++row ) {
  for ( int col = -20; col < 40; ++col ) {
    float x = col * 40;
    float y = row * 40;

    if ( random(1) < bias ) {
      // Draw a line from NW to SE
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```

But this is inefficient, inelegant, and limited.

What we really want is a permanent way to associate pseudorandom values with points in space.

Let’s examine a simpler 1D problem.

Drawing a graph of random values

```
beginShape();
for( int x = 0; x < 600; ++x ) {
  vertex( x, random( 0, height ) );
}
endShape();
```

Graphing a mathematical function

```
float myFunc( float x )
{
  float y = sin( x / 50.0 );
  return map( y, -1, 1, 0, height );
}
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}
```

```
…
beginShape();
for( int x = 0; x < 600; ++x ) {
  vertex( x, myFunc( x ) );
}
endShape();
```

```
float dx;

…
beginShape();
for( int x = 0; x < 600; ++x ) {
  vertex( x + dx, myFunc( x ) );
}
endShape();
```

```
float dx;

…
beginShape();
for( int x = 0; x < 600; ++x ) {
  vertex( x, myFunc( x - dx ) );
}
endShape();
```

```
float noise( float x ) { ... }
```

Return a “random” value between 0 and 1. The return value is always the same for a given input value x**.**

Note: `noise()` **is a *smooth* function. If you zoom in enough, it changes slowly.**

```
float noise( float x, float y ) { ... }
```

Return a “random” value between 0 and 1. The return value is always the same for given input values `x` and `y`.

```
float noise( float x, float y ) { ... }
```

Return a “random” value between 0 and 1. The return value is always the same for given input values `x` and `y`.

```
float noise( float x, float y, float z ) { ... }
```

Visualizing 2D noise

```
void draw()
{
  for( int y = 0; y < height; ++y ) {
    for( int x = 0; x < width; ++x ) {
      float ns = 255 * noise( x, y );
      set( x, y, color( ns ) );
    }
  }
}
```

Direct manipulation of a grid

Direct manipulation of an infinite grid is challenging because we only want to draw as much of the grid as we need.

Summary

- Be able to write short sketches that use the `noise()` function.
- Understand how `noise()` works in 1D and 2D.
- Understand the difference `random()` and `noise()`.