Lecture 7: coordinate systems II

Programming for VR I

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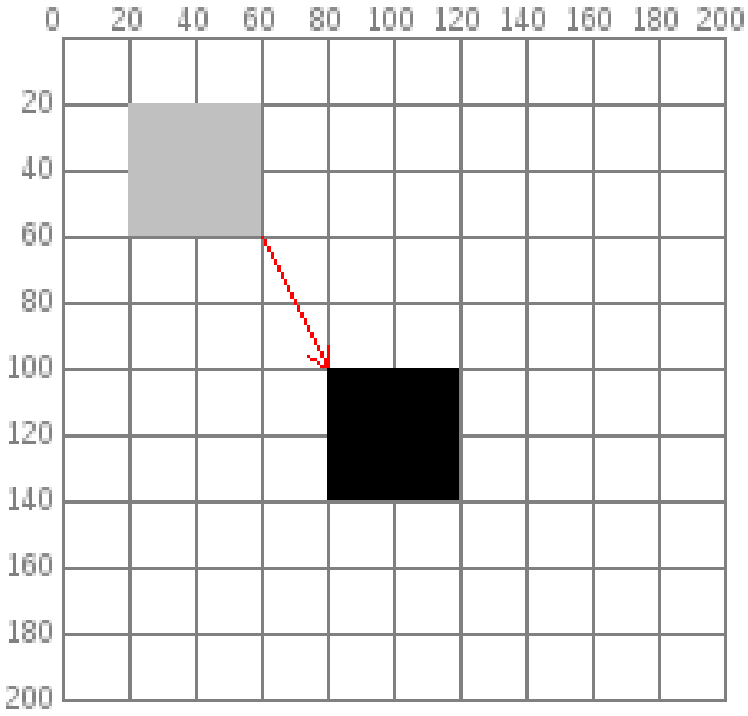
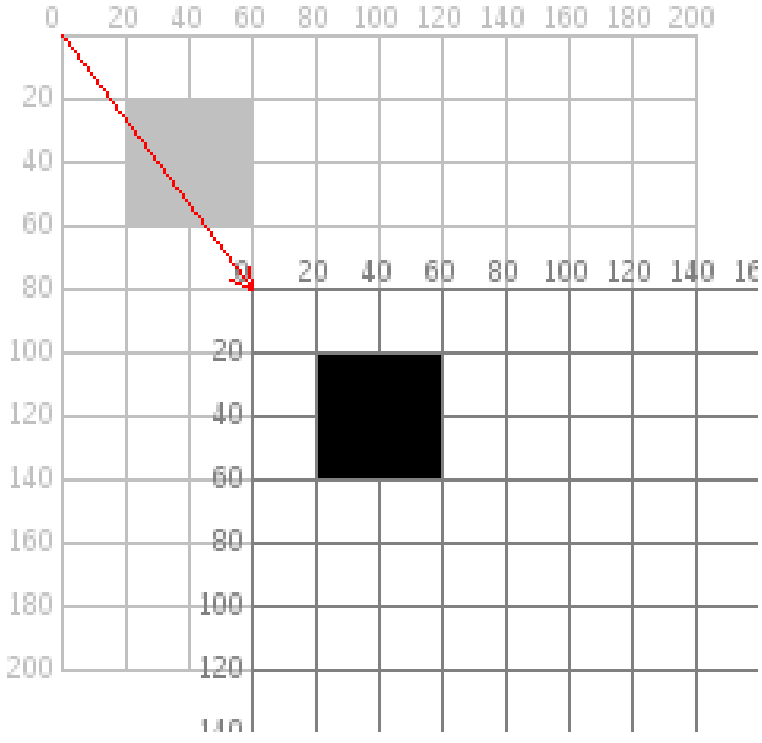
We did so much!

- Python
- git
- basic data types
- arithmetic
- if/else
- for loops
- coordinates
- responding to inputs
- debugging

Transformations

- We can move things, or we can move coordinate systems





Equivalent output

- Direct method:

```
rect(x, y, w, h)
```

- Indirect method:

```
pushMatrix()
translate(x, y)
rect(0, 0, w, h)
popMatrix()
```

Is this useful?

If we've created a function like this:

```
def house():
  triangle(15, 0, 0, 15, 30, 15)
  rect(0, 15, 30, 30)
  rect(12, 30, 10, 15)
```

We can move the house around with:

```
pushMatrix()
translate(x, y)
house()
popMatrix()
```

Transformations

- `translate(x, y)`
- `rotate(radians)`: note 180 degrees = `PI` radians
- `size(scalex, scaley)`: also scales lines

Let's make a tree!

- Our tree is going to be thin at the top, wide at the bottom
- It's going to have diamond shaped decorations
- Some decorations are going to be bigger than others
- A diamond is a rectangle rotated 45 degrees
- Use `translate`, `rotate` and `scale`
- Stretch: add sparkles to your tree

My tree

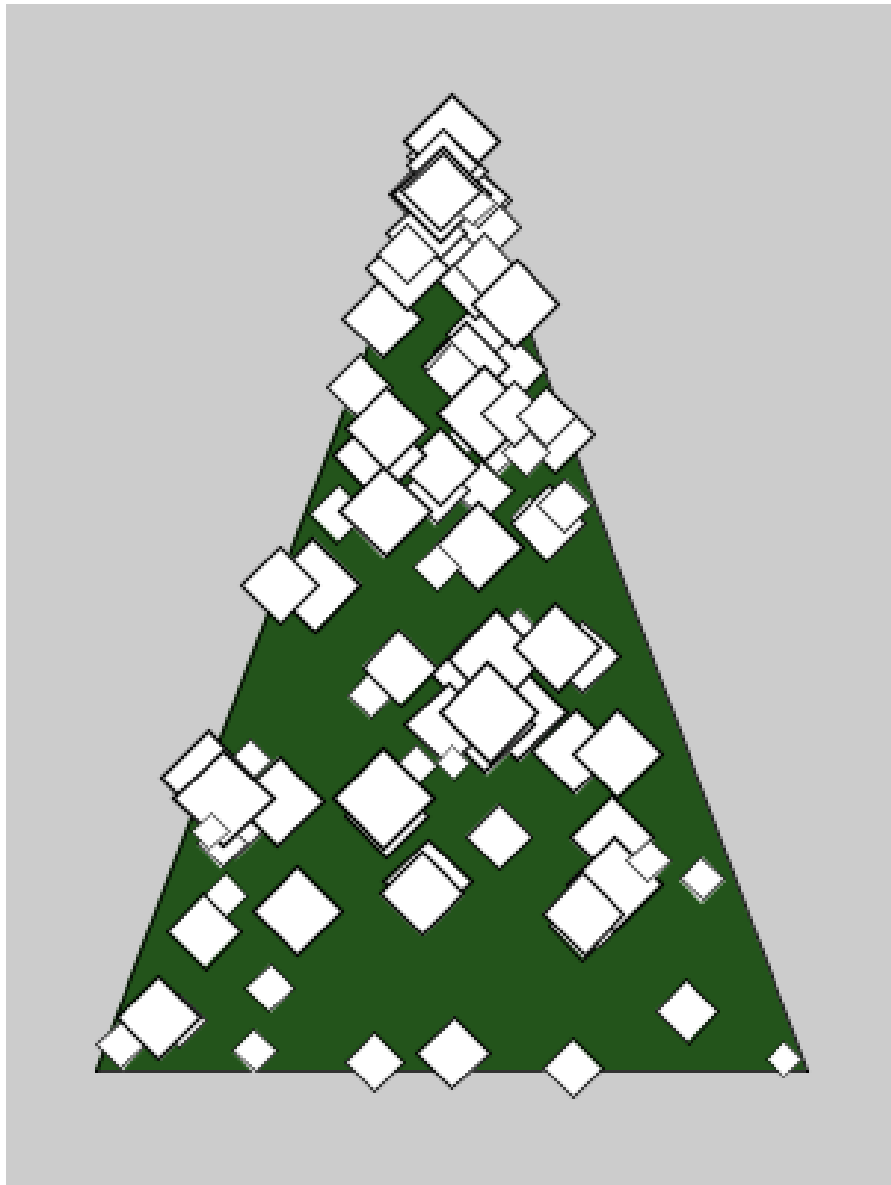


Figure 1: Tree

Stretch challenge

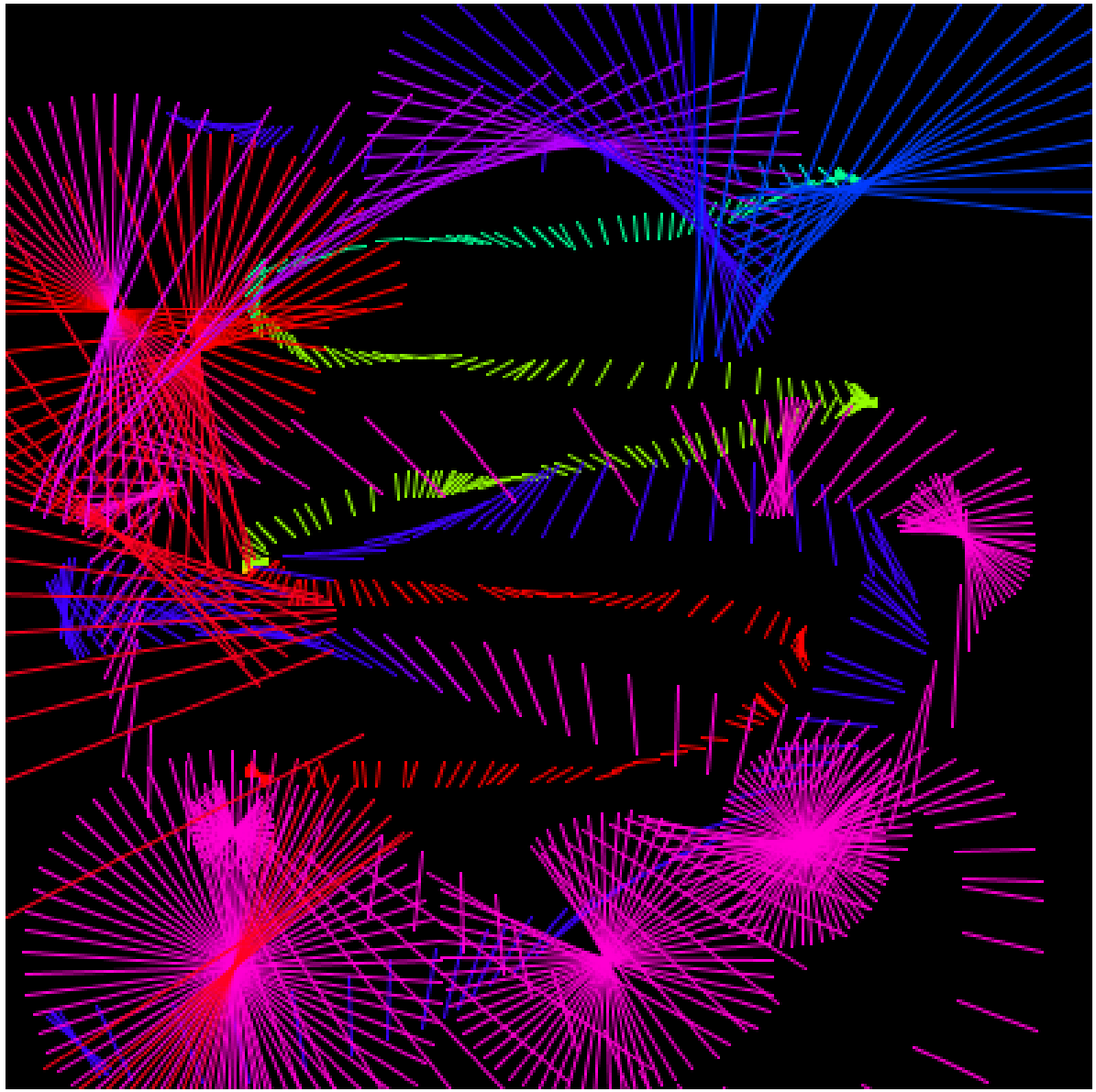


Figure 2: Line