Announcements - 2/24

- Create FP repo by tonight (midnight)
- A3 due tonight (10pm)
- FP milestone 1 due Monday
- Complete line lab by Friday night (10pm)

Lines: ✓

Modeling: $y = mx+b$, $ax+by+c=0$ → (implicit); $\vec{p}+t\vec{d}$ → (parametric)

Rendering: Bresenham / midpoint alg.

Curves:

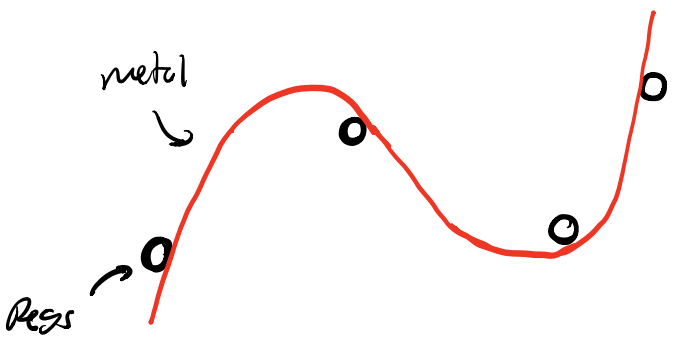
Modeling: piecewise (low-degree) polynomial pieces

Rendering: GOTO modeling → piecewise linear segments

Modeling Curves: The old-fashioned way, used in ship building

→ Control: pegs

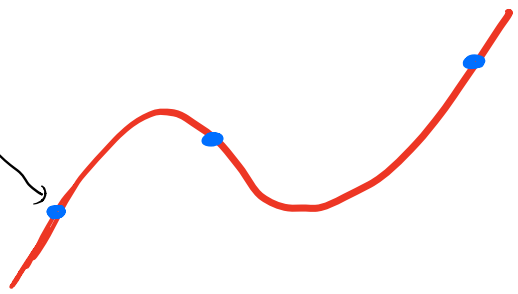
→ Smoothness: physics



Modeling Curves: The Math Way

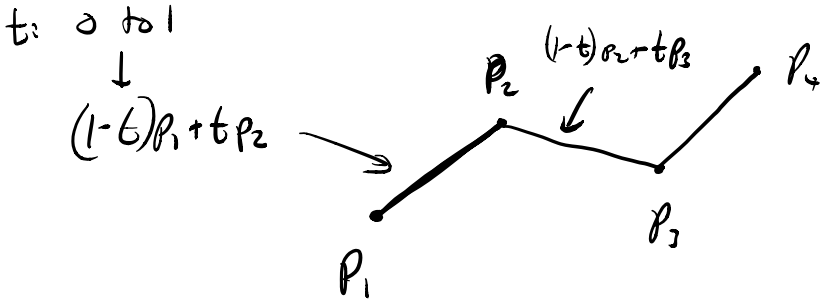
→ control: control points

→ smoothness: low-deg polynomial



Simplest Case: degree-1 polynomials

a.k.a. line segments



Two problems:

(1) not smooth ☹

doesn't generalize nicely to degree-k polynomials.

Reminder: linear interpolation ("lerp")

$$f(u) = (\quad)p_0 + \quad p_1$$

Notation:

- u is like t, but by convention varies only from 0 to 1.
- p_0, p_1 are vectors (of any dimension!)

equivalently:

$$f(u) = 1\,a_0 + u \cdot a_1 \leftarrow \text{a 1-degree polynomial}$$

$$f(u) = u^0 a_0 + u^1 a_1 = \begin{bmatrix} 1 & u \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \end{bmatrix}$$

Converting from p to a: