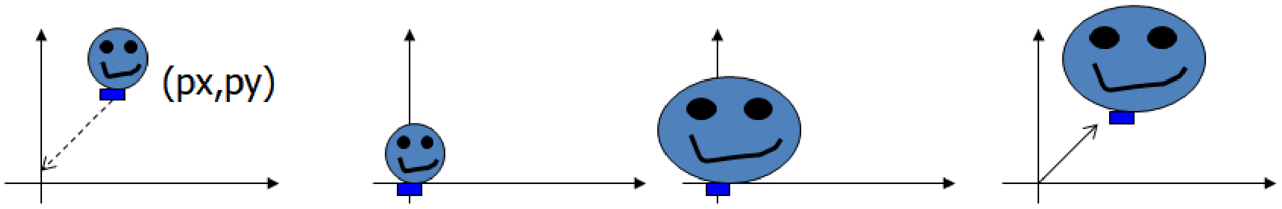
Scaling Revisit

- To scale about an arbitrary fixed point P (px,py):
  - Translate the object so that P will coincide with the origin: T(-px, -py)
  - Scale the object: S(sx, sy)
  - Translate the object back: T(px,py)



Types of Curves / Surfaces

- Explicit:

$$y = mx + b \qquad z = A\,x + B\,y + C$$

- Implicit:

$$Ax + By + C = 0 \qquad (x - x_0)^2 + (y - y_0)^2 - r^2 = 0$$

- Parametric:

$$x = x_0 + (x_1 - x_0)\ t \qquad x = x_0 + r\cos\theta$$

$$y = y_0 + (y_1 - y_0)\ t \qquad y = y_0 + r\sin\theta$$

Parametric surfaces

- Hermite curve
- Bezier curve

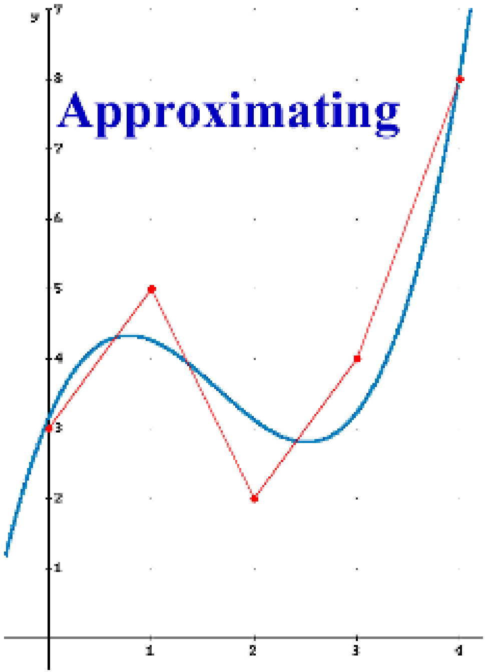
Why parametric?

- Parametric curves are very flexible.
- Parameter count gives the object's dimension.

  (x(u,v), y(u,v), z(u,v)) : 2D surface
- Coord functions independent.

Specifying curves

- Control Points:
  - A set of points that influence the curve's shape.
- Interpolating curve:
  - Curve passes through the control points.
- Control polygon:
  - Control points merely influence shape.

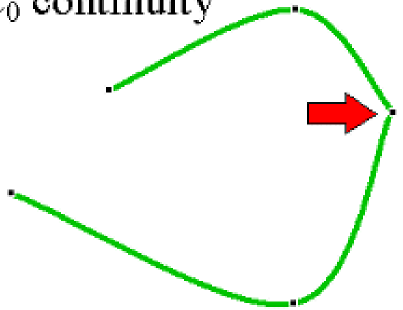


Piecewise curve segments

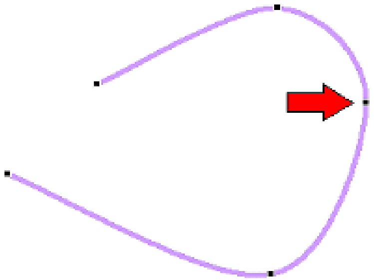
We can represent an arbitrary length curve as a series of curves pieced together.

But we will want to control how these curves fit together …

C_0 continuity



C_0 & C_1 continuity



C_0 & C_1 & C_2 continuity