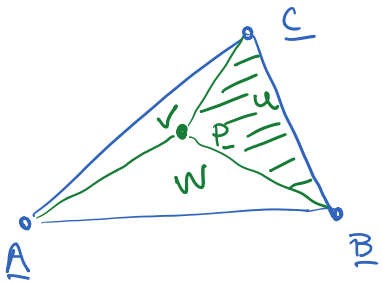
Still have this week to complete the teapot.

Barycentric Coordinates for the triangle



$$\underline{P} = u\underline{A} + v\underline{B} + w\underline{C}$$

$u+v+w = 1$ (normalized area)

$w = 1-u-v$

$u+v \leq 1$

$\underline{P}$ is in the triangle if

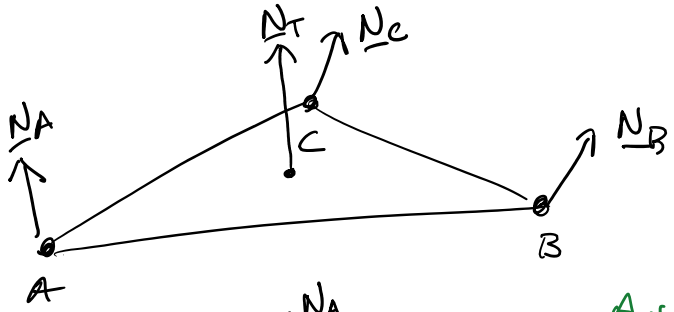
$0 \leq u, v, w \leq 1$

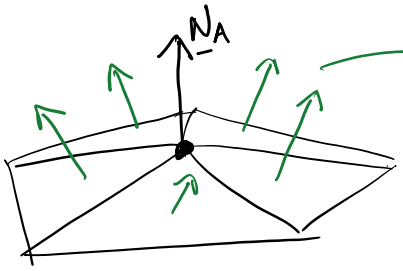
"Areal Coordinates"

$$\text{Triangle Area} = \frac{|\underline{B}-\underline{A}| * |\underline{C}-\underline{A}| \sin\theta}{2}$$

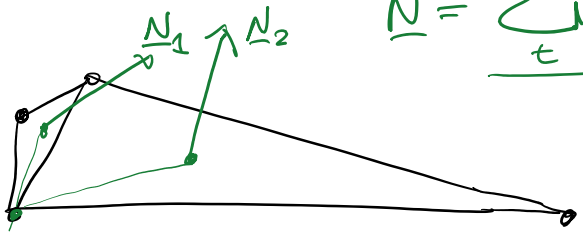
$$= \frac{|(\underline{B}-\underline{A}) \times (\underline{C}-\underline{A})|}{2}$$

These allow the interpolation of any Vertex Data.





Average over the surrounding triangles.



$$\underline{N} = \frac{\sum_t \text{Area}_t \cdot \underline{N}_t}{\sum_t \text{Area}_t}$$

SPH based on interpolating data at points

$$\underline{N}_{\underline{I}}(\underline{r}) = \int_V \underline{N}(\underline{r}')\, W(\underline{r}' - \underline{r}, h)\, d\underline{r}'$$

$$\underline{N}_i = \sum_j \frac{m_j}{\rho_j} \underline{N}_j W_{ij}$$

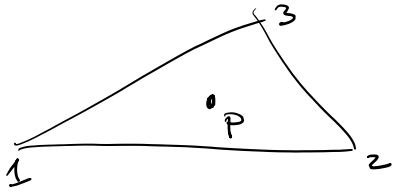
SPH-like smoothed vertex normal at vertex i

Shadows and edges of objects are still going to be faceted.

This is a trick and to make shadows and edges look smooth you need more triangles.

In the Phong & Reflection code you need a Normal.

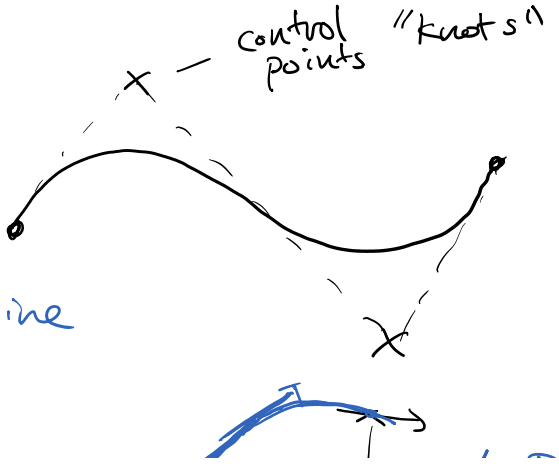
$$\underline{N} = \underline{N}_1 u + \underline{N}_2 v + \underline{N}_3 w$$

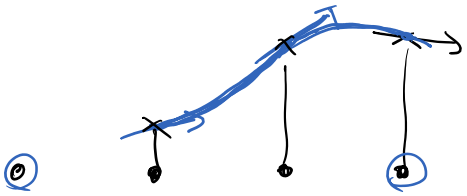


Bezier Curves

B-spline

Bi-cubic Spline





1-D cubic spline

3000 triangles can take time ~1s for 1 geom.
⇒ could take ≤1 hour to render