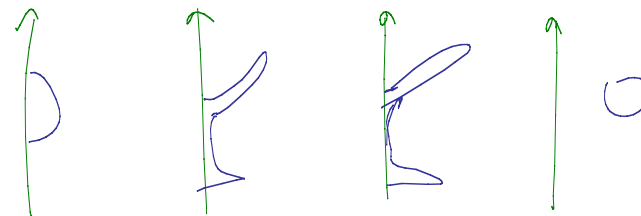# Surfaces of Revolution

CSE 457
Winter 2014
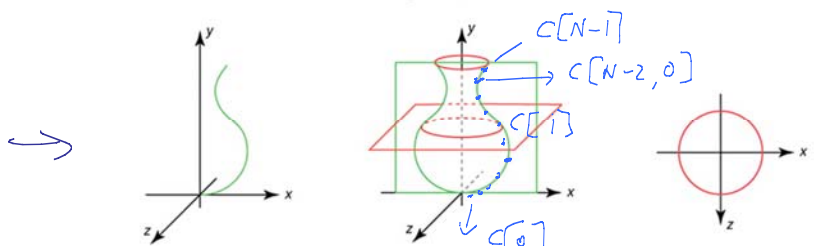

Surfaces of revolution

Idea: rotate a 2D **profile curve** around an axis.

What kinds of shapes can you model this way?

Constructing surfaces of revolution

$C[N-1]$
$C[N-2, 0]$
$C[i]$
$C[0]$

Given: A curve $C(u)$ in the xy-plane:

$$C(u) = \begin{bmatrix} c_x(u) \\ c_y(u) \\ 0 \\ 1 \end{bmatrix}$$

Let $R_y(\theta)$ be a rotation about the y-axis.

Find: A surface $S(u, v)$ which is $C(u)$ rotated about the y-axis, where $u, v \in [0, 1]$.

Solution:

$$\Delta = \frac{2\pi}{M}$$

$$\theta_j = j \cdot \frac{2\pi}{M}$$

$$S[i,j] = R_y[\theta_j] C[i]$$

$$S[i,j] = R_y\left[j \cdot \frac{2\pi}{M}\right] C[i]$$

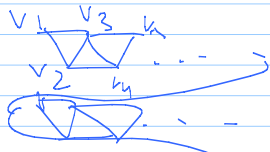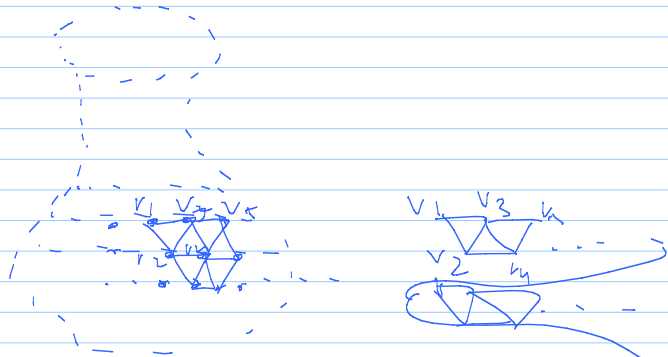## Constructing surfaces of revolution

We can sample in u and v to get a grid of points over the surface.
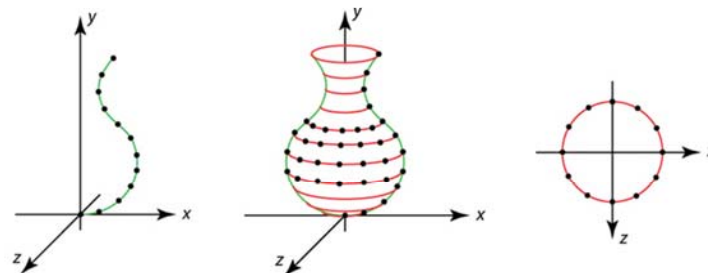
How would we turn this into a mesh of triangles?

How would we generate normals?

How would we assign texture coordinates?

V_1 V_3 V_5

V_2 V_4

V_1 V_3 V_4

V_2 V_4

gl Draw Element

gl Begin [GL_TRIAN... STRIP]

gl vertex [   ]