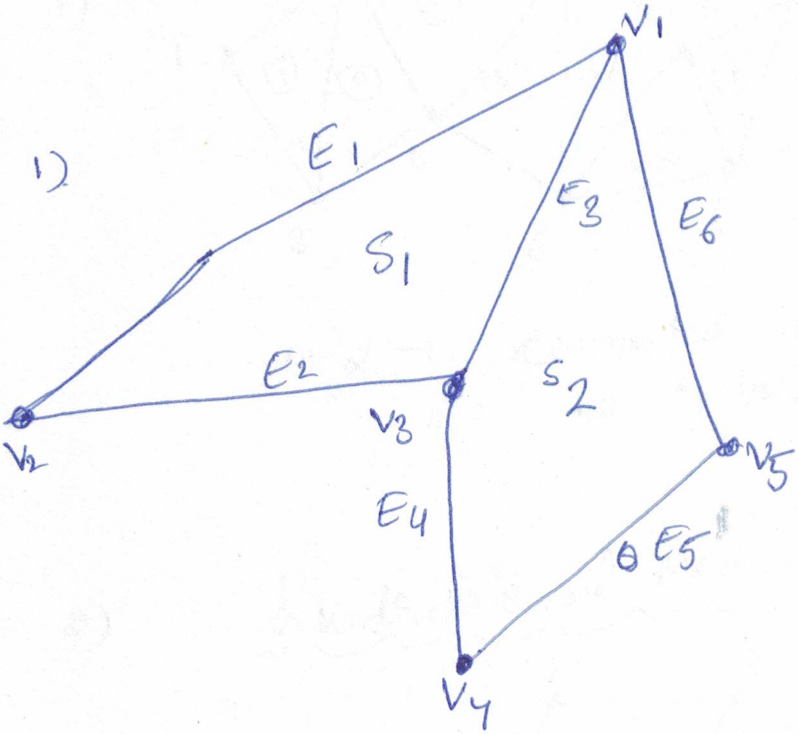
⇒ 3-D display methods:

1) Polygon surfaces, tables, equations, meshes
2) Curved lines & surfaces
3) Quadric surfaces.

1)



Vertex table

$V_1 : x_1, y_1, z_1$

$V_2 : x_2, y_2, z_2$

$V_3 : x_3, y_3, z_3$

$V_4 : x_4, y_4, z_4$

$V_5 : x_5, y_5, z_5$

Polygon Surface:

$S_1 : E_1, E_2, E_3$

$S_2 : E_3, E_4, E_5, E_6$

Edge Table:

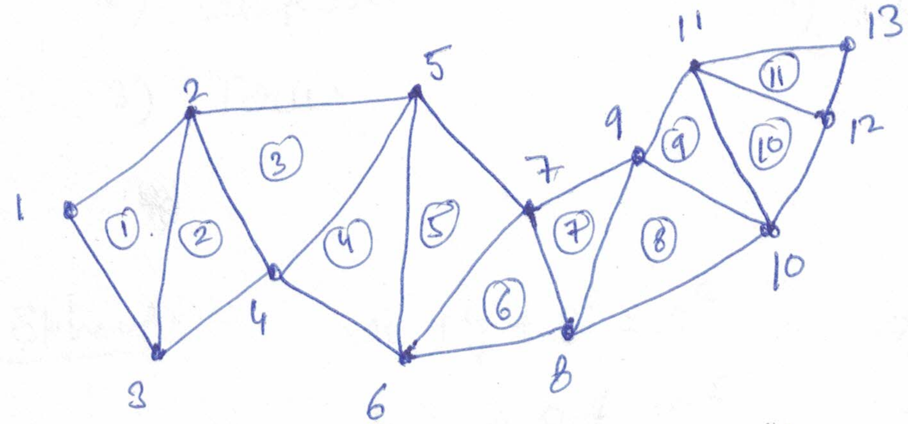
E_1 :	V_1, V_2	S_1
E_2 :	V_2, V_3	S_1
E_3 :	V_3, V_1	S_1, S_2
E_4 :	V_3, V_4	S_2
E_5 :	V_4, V_5	S_2
E_6 :	V_5, V_1	S_2

Edge table for the surface

Polygon Meshes:

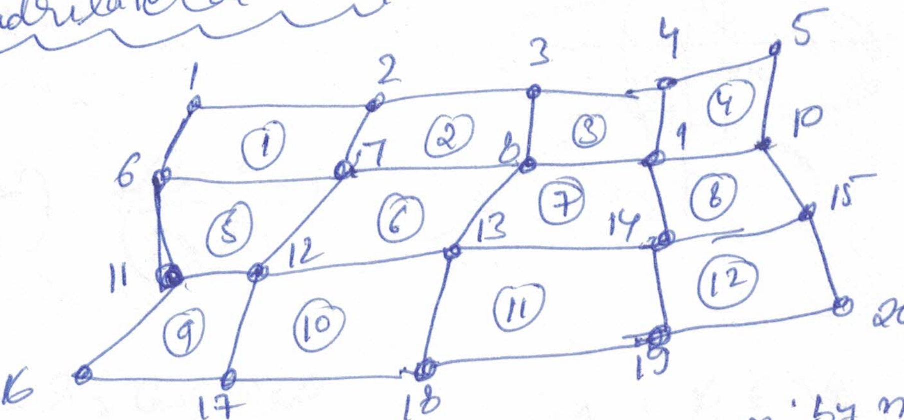
1) Triangle Strip
2) Quadrilateral Mesh

1)



$n-2 \rightarrow$ connected triangles
$n \rightarrow$ no of vertices

2) Quadrilateral Mesh:



$n = 5$
$m = 4$

n by m array of vertices

Generates Mesh of $\Rightarrow$ $(n-1)$ by $(m-1)$
$\Rightarrow$ 4 by 3 $=$ 12 Quadrilaterals

Quadric Surfaces:

1) Sphere
2) Ellipsoid
3) Torus

SuperQuadrics

1) superellipse
2) superellipsoid

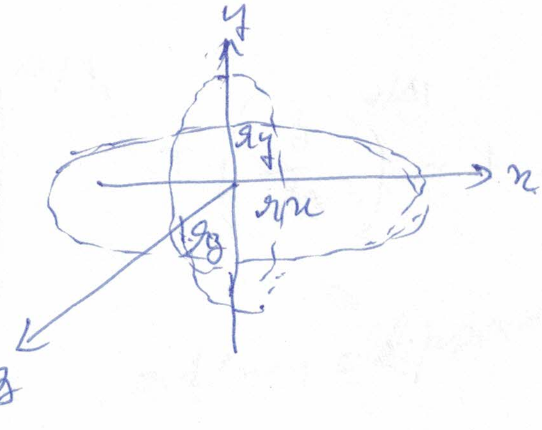
1) Sphere:

$$x^2+y^2+z^2=r^2$$

$$x = r\cos\phi\cos\theta$$
$$y = r\cos\phi\sin\theta$$
$$z = r\sin\phi$$

$$-\pi/2 \le \phi \le \pi/2$$
$$-\pi \le \theta \le \pi$$

2) Ellipsoid:

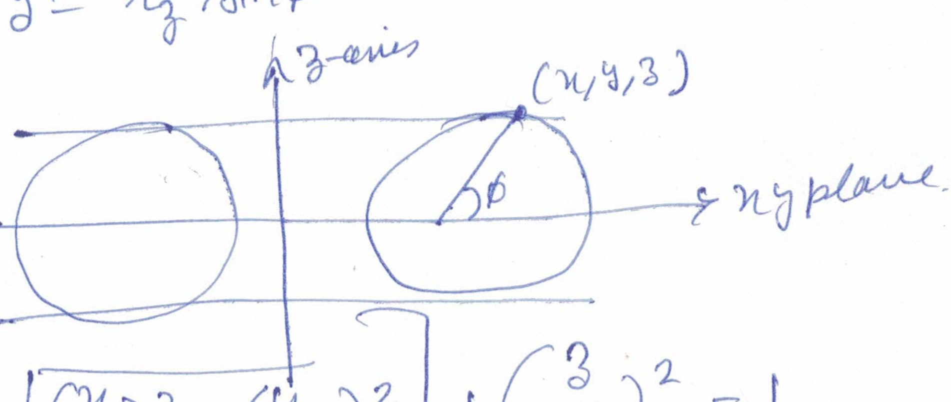


$$\left(\frac{x}{r_x}\right)^2+\left(\frac{y}{r_y}\right)^2+\left(\frac{z}{r_z}\right)^2=1$$

$$x = r_x\cos\phi\cos\theta$$
$$y = r_y\cos\phi\sin\theta$$
$$z = r_z\sin\phi$$

$$-\frac{\pi}{2} \le \phi \le \pi/2$$
$$-\pi \le \theta \le \pi$$

3) Torus.



$$x = r_x (r + \cos\phi) \cos\theta \qquad -\pi \le \phi \le \pi$$
$$y = r_y (r + \cos\phi) \sin\theta \qquad -\pi \le \theta \le \pi$$
$$z = r_z \sin\phi$$

4) Superellipse :

$$\left(\frac{x}{r_x}\right)^{2/s} + \left(\frac{y}{r_y}\right)^{2/s} = 1$$

$s \rightarrow$ any real value.

if $s = 1$, ordinary ellipse.

5) Superellipsoid:

$$\left[\left(\frac{x}{r_x}\right)^{2/s_2} + \left(\frac{y}{r_y}\right)^{2/s_2}\right]^{s_2/s_1} + \left(\frac{z}{r_z}\right)^{2/s_1} = 1$$

if $s_1 = s_2 = 1$, ordinary ellipsoid.