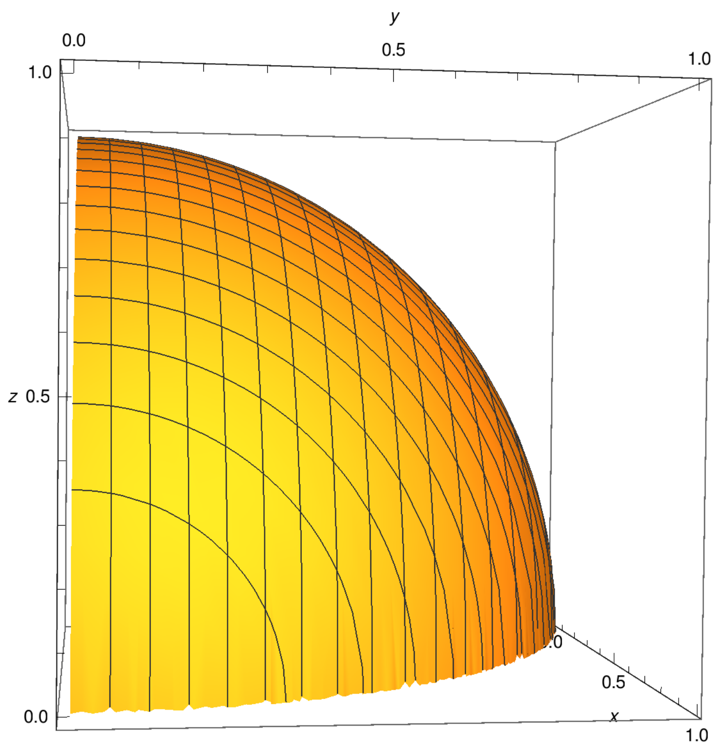
Tapp 3.32 (2) Plot $S_m$for several choices of m. What does it look like for large m.

In[301]:=
```
x[u_, v_, m_] := u
y[u_, v_, m_] := v
z[u_, v_, m_] := (1 - u^m - v^m)^(1/m)
```

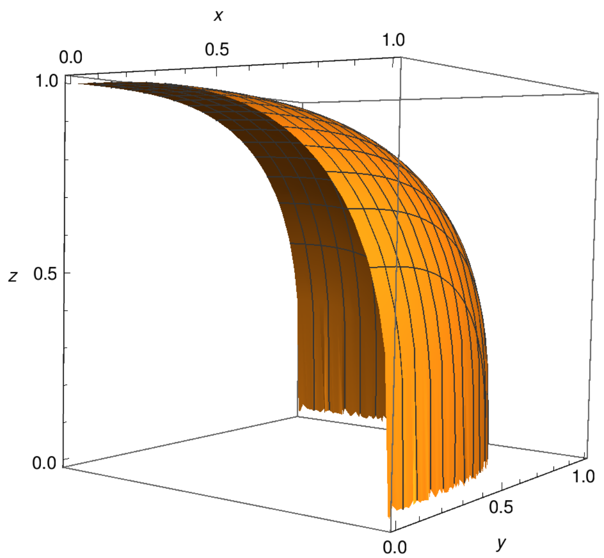
In[308]:=
```
ParametricPlot3D[{x[u, v, 2], y[u, v, 2], z[u, v, 2]},
 {u, 0, 1}, {v, 0, 1}, AxesLabel → {x, y, z}]
```

Out[308]=

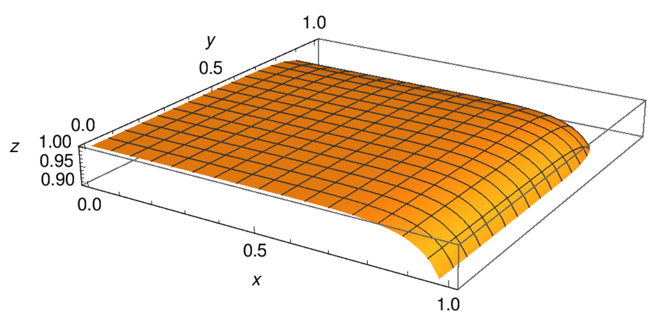


In[309]:=
```
ParametricPlot3D[{x[u, v, 3], y[u, v, 3], z[u, v, 3]},
 {u, 0, 1}, {v, 0, 1}, AxesLabel → {x, y, z}]
```

Out[309]=

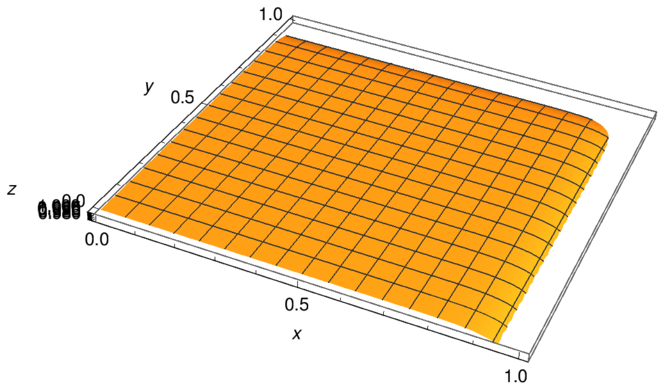


In[310]:=
```
ParametricPlot3D[{x[u, v, 11], y[u, v, 11], z[u, v, 11]},
 {u, 0, 1}, {v, 0, 1}, AxesLabel → {x, y, z}]
```



In[313]:=
```
ParametricPlot3D[{x[u, v, 20], y[u, v, 20], z[u, v, 20]},
 {u, 0, 1}, {v, 0, 1}, AxesLabel → {x, y, z}]
```

Out[314]=



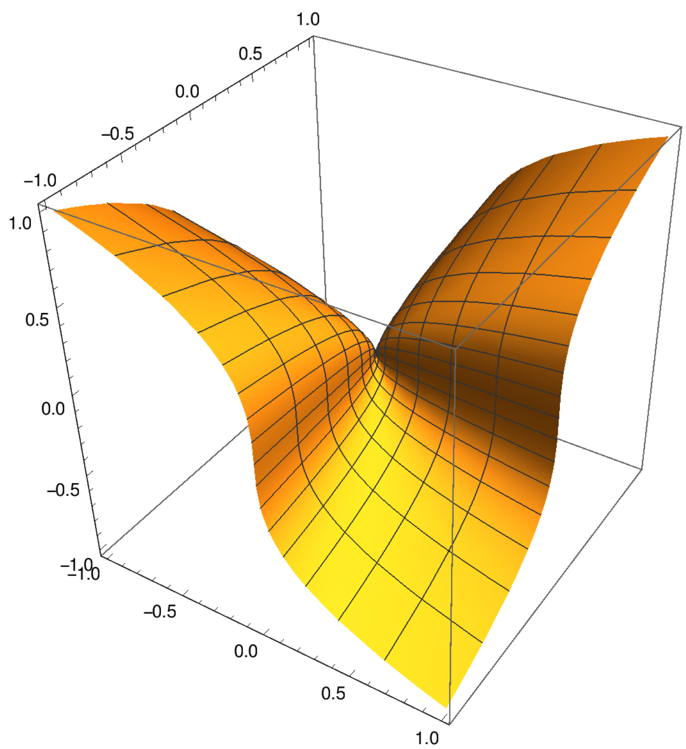
As we can see, for large values of m, this looks like it is approaching the yz.

Tapp 3.33 - Which point(s) of the domain of each function must be removed (if any) to make it a parametrized surface?

In[350]:=

```
σx1[u_, v_] := u^3
σy1[u_, v_] := v^3
σz1[u_, v_] := u * v
ParametricPlot3D[{σx1[u, v], σy1[u, v], σz1[u, v]}, {u, -1, 1}, {v, -1, 1}]
```

Out[353]=



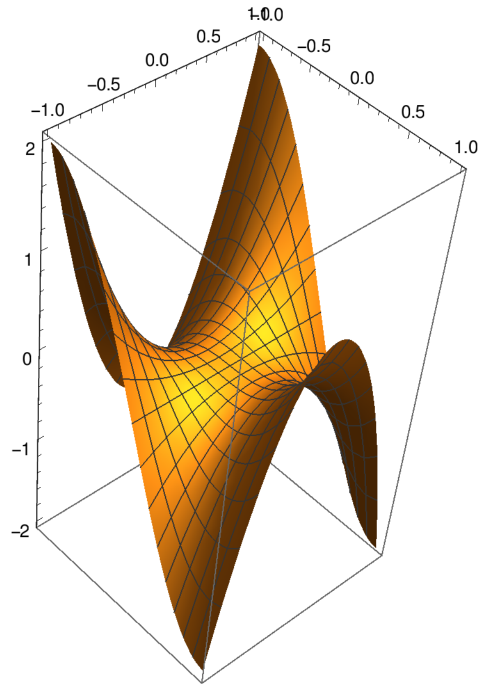
It looks like the only problem point for this surface is at the origin where the graph has a kink.

In[374]:=

```
σx2[u_, v_] := u
σy2[u_, v_] := v
σz2[u_, v_] := u^3 - 3 * u * v^2
ParametricPlot3D[{σx2[u, v], σy2[u, v], σz2[u, v]}, {u, -1, 1}, {v, -1, 1}]
```

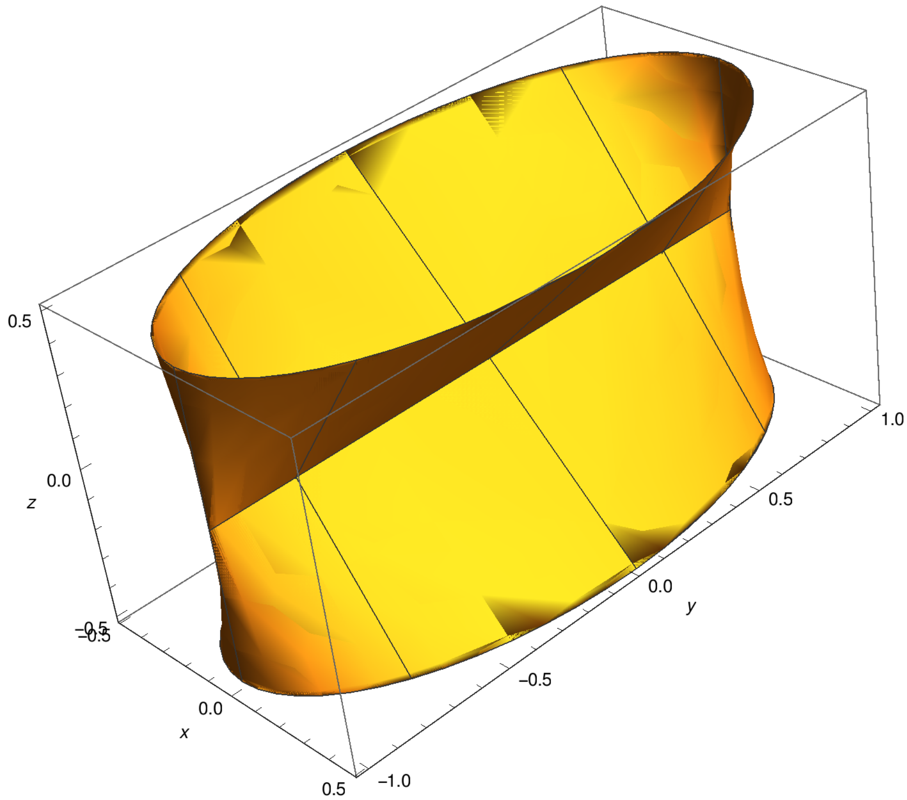
I could not get graph output for [-10,10] as the u,v intervals so I restricted them to [-1,1]. It does not look like we need to remove any points to make the surface regular.

Out[377]=



In[390]:=
```
σx3[u_, v_] := Cos[u] * Cos[v] * Sin[v]
σy3[u_, v_] := Sin[u]
σz3[u_, v_] := Cos[v] * Sin[v]
ParametricPlot3D[{σx3[u, v], σy3[u, v], σz3[u, v]},
 {u, -2 π, 2 π}, {v, -2 π, 2 π}, AxesLabel → {x, y, z}]
```

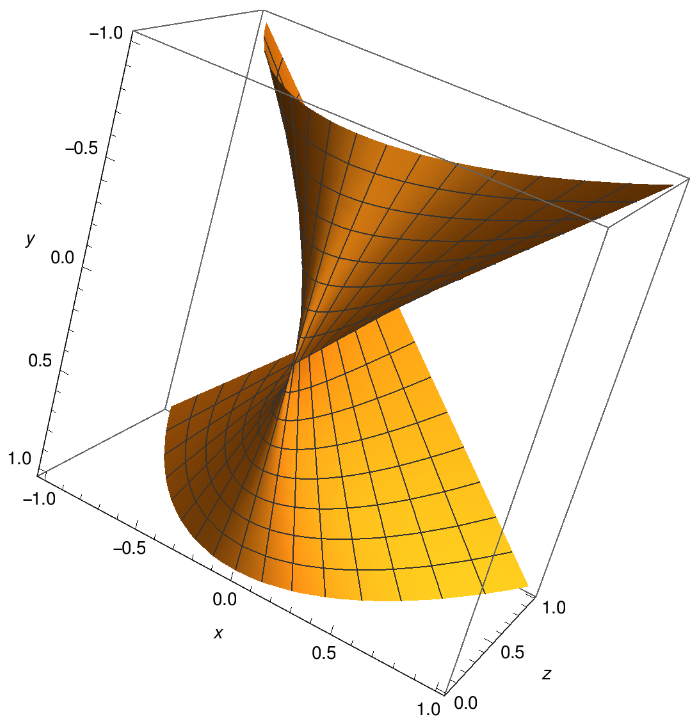
Out[393]=



This surface looks like we would need to remove the line x=z=0.

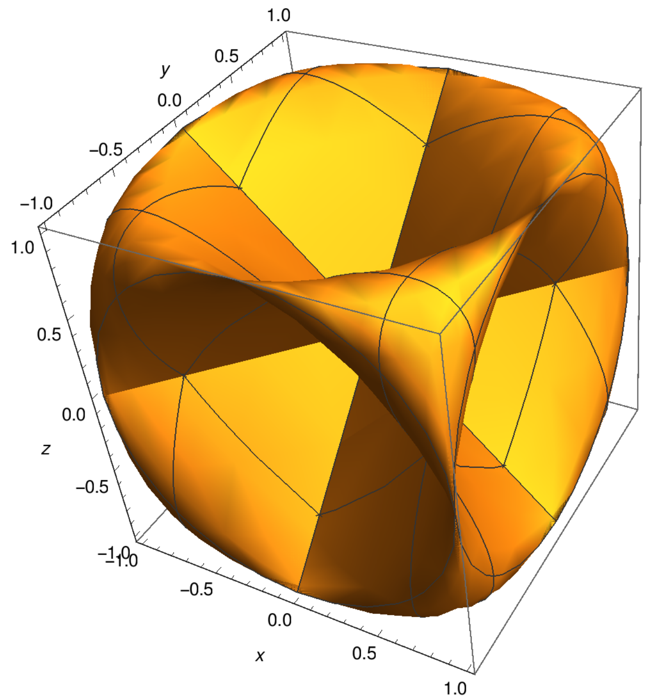
In[406]:=
```
σx4[u_, v_] := u * v
σy4[u_, v_] := u
σz4[u_, v_] := v^2
ParametricPlot3D[{σx4[u, v], σy4[u, v], σz4[u, v]},
 {u, -1, 1}, {v, -1, 1}, AxesLabel → {x, y, z}]
```

Out[409]=



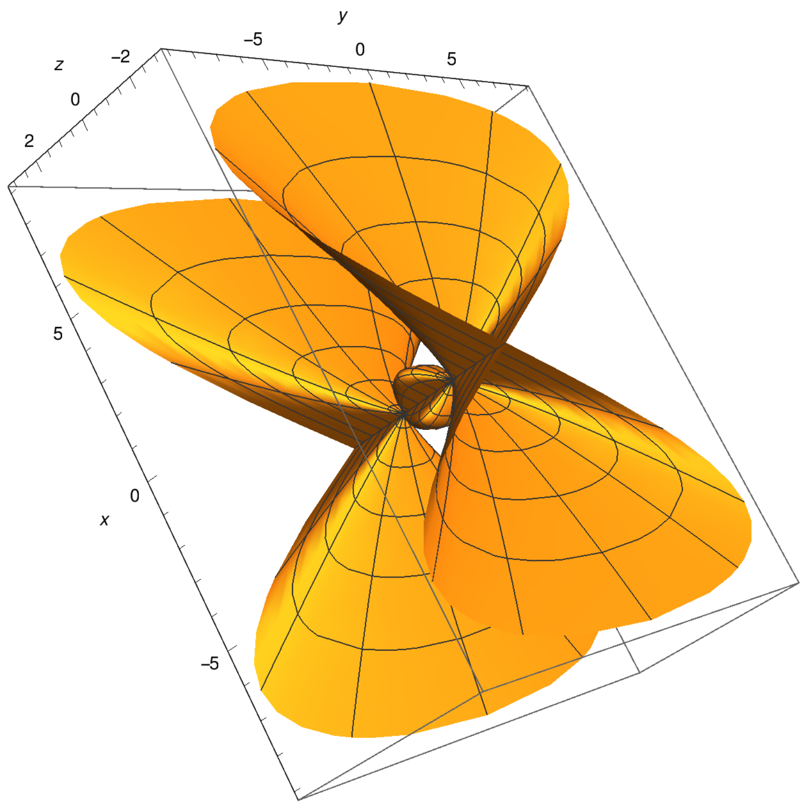
I decreased the domain to make the graph easier to view. It looks like we would need to remove the line x=y=0 to make this surface parametrized.

In[414]:=
```
σx5[u_, v_] := Sin[u]
σy5[u_, v_] := Sin[v]
σz5[u_, v_] := Sin[u + v]
ParametricPlot3D[{σx5[u, v], σy5[u, v], σz5[u, v]},
 {u, -2 π, 2 π}, {v, -2 π, 2 π}, AxesLabel → {x, y, z}]
```

Out[417]=


To make this surface parametrized, we would need to remove the origin and all 4 of those lines that are making sharp creases in the surface. This shape looks really interesting.

In[418]:=
```
σx6[u_, v_] := (1 - u^2) * Sin[v]
σy6[u_, v_] := (1 - u^2) * Sin[2 * v]
σz6[u_, v_] := u
ParametricPlot3D[{σx6[u, v], σy6[u, v], σz6[u, v]},
 {u, -π, π}, {v, -π, π}, AxesLabel → {x, y, z}]
```



This has to be the craziest looking surface so far! I think you would need to remove the line x=y=0 from this surface to make it a parametrized surface as that is where all the creasing happens.