

https://github.com/t-o-k/Maxima-bezier/bezier_surface_3d.wmx

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```
(%i1) load("draw")$

(%i2) load("bezier")$

(%i3) points_x:
      matrix(
        [ +0.0, +1.0, 2.0, +3.0 ],
        [ +0.0, +1.0, 2.0, +4.0 ],
        [ +0.0, +1.0, 2.0, +2.5 ],
        [ +0.0, +1.0, 2.0, +3.0 ]
      )
$

(%i4) points_y:
      matrix(
        [ +0.0, +0.0, +1.0, +0.0 ],
        [ +1.0, +1.0, +2.0, +1.0 ],
        [ +2.0, +2.0, +3.0, +2.0 ],
        [ +3.0, +3.0, +5.0, +3.0 ]
      )
$

(%i5) points_z:
      matrix(
        [ +2.0, +0.0, +0.0, -3.0 ],
        [ -2.0, -3.0, -2.0, +3.0 ],
        [ +0.0, -4.0, +0.0, +2.0 ],
        [ +2.0, +0.0, +0.0, -3.0 ]
      )
$

(%i6) define(surface_x(u, v), bezier_function_2a(points_x, u, v))$

(%i7) define(surface_y(u, v), bezier_function_2a(points_y, u, v))$

(%i8) define(surface_z(u, v), bezier_function_2a(points_z, u, v))$

(%i9) expand(surface_x(u, v));
(%o9)  $4.5 u^3 v^3 - 7.5 u^3 v^2 + 3.0 u^3 v + 3.0 u$ 
```

```
(%i10) expand(surface_y(u, v));
```

```
(%o10)  $-3.0 u^3 v^3 + 3.0 u^2 v^3 + 3.0 v^3 - 3.0 u^3 + 3.0 u^2$ 
```

```
(%i11) expand(surface_z(u, v));
```

```
(%o11)  $36.0 u^3 v^3 - 54.0 u^2 v^3 + 27.0 u v^3 - 6.0 v^3 - 57.0 u^3 v^2 +$   

 $54.0 u^2 v^2 - 36.0 u v^2 + 18.0 v^2 + 21.0 u^3 v + 9.0 u v - 12.0 v - 5.0 u^3$   

 $+ 6.0 u^2 - 6.0 u + 2.0$ 
```

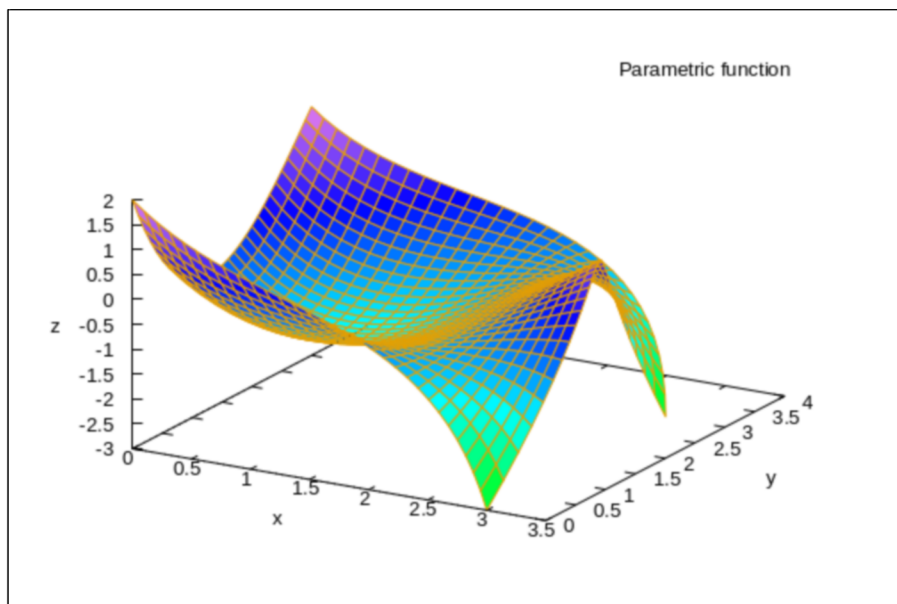
```
(%i12) wxplot3d(
```

```
[  
    surface_x(u, v),  
    surface_y(u, v),  
    surface_z(u, v)
```

```
],  
[ u, 0, 1 ],  
[ v, 0, 1 ]
```

```
);
```

```
(%t12)
```



```
(%o12)
```