```
> #Bending of beam
> with(plots):
> with(plottools):
> #the mapping. R is a length and nu Poisson's ratio
> x:=(X,Y,Z)->X-(X*Y)/R;
```

$$x := (X, Y, Z) \to X - \frac{X\,Y}{R} \tag{1}$$

```
> y:=(X,Y,Z)->Y+(X^2+nu*(Y^2-Z^2))/(2*R);
```

$$y := (X, Y, Z) \to Y + \frac{1}{2}\,\frac{X^2 + \nu\left(Y^2 - Z^2\right)}{R} \tag{2}$$

```
> z:=(X,Y,Z)->Z+(nu*Y*Z)/R;
```

$$z := (X, Y, Z) \to Z + \frac{\nu\,Y\,Z}{R} \tag{3}$$

```
> R:=3;
```

$$R := 3 \tag{4}$$

```
> nu:=0.45;
```

$$\nu := 0.45 \tag{5}$$

```
> unassign('Y');
> Y;
> unassign('Z');
```

$$Y \tag{6}$$

```
> Z;
```

$$Z \tag{7}$$

```
> a:=1;
```

$$a := 1 \tag{8}$$

```
>
> b:=.4;
```

$$b := 0.4 \tag{9}$$

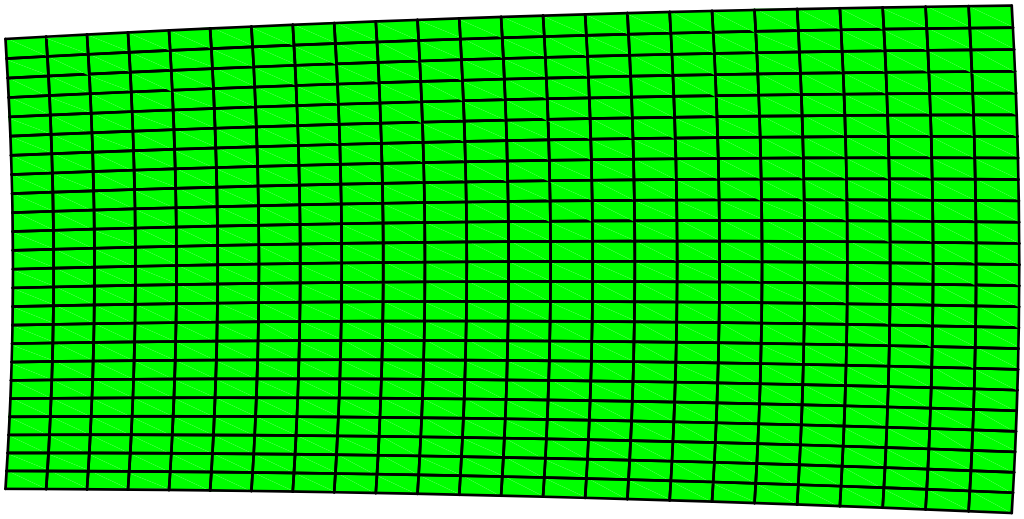
```
> c:=.4;
```

$$c := 0.4 \tag{10}$$

```
> X:=a;
```

$$X := 1 \tag{11}$$

```
> s1:=plot3d([x(X,Y,Z),y(X,Y,Z),z(X,Y,Z)],Y=-b..b,Z=-c..c,color=
  green):s1;
```



```
> X:=-a;
```

$$X := -1 \tag{12}$$

```
> S2:=plot3d([x(X,Y,Z),y(X,Y,Z),z(X,Y,Z)],Y=-b..b,Z=-c..c,color=
  yellow):S2;
```

```
> unassi gn( ' X' ) ;
```

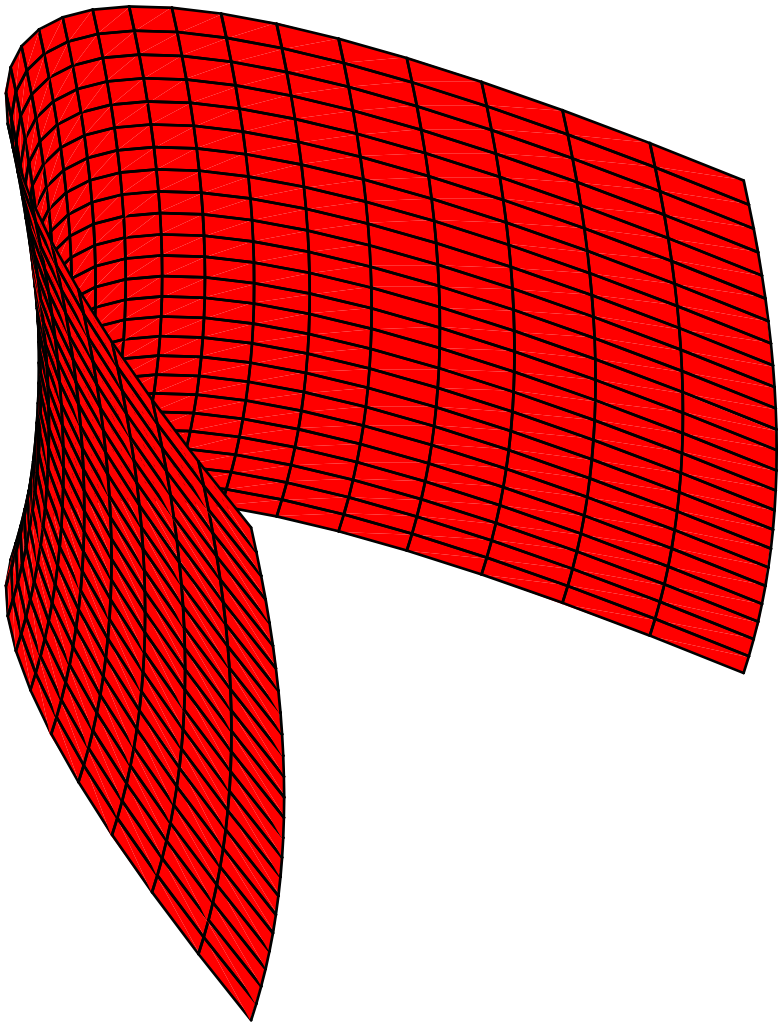
```
> X;
```

$$X \tag{13}$$

```
> Y: =- b;
```

$$Y := -.4 \tag{14}$$

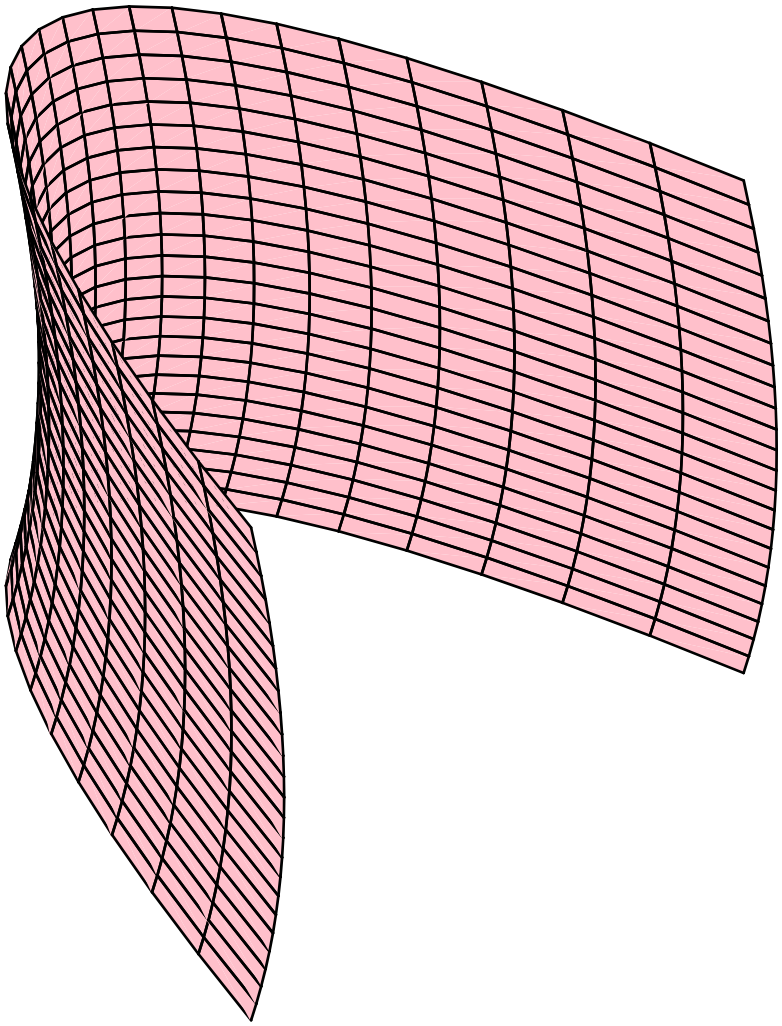
```
> S3: =pl ot 3d( [ x( X, Y, Z) , y( X, Y, Z) , z( X, Y, Z) ] , X=- a. . a, Z=- c. . c, col or =
  r ed) : S3;
```



```
> Y: =b;
```

$$Y := 0.4 \tag{15}$$

```
> S4: =pl ot 3d( [ x( X, Y, Z) , y( X, Y, Z) , z ( X, Y, Z) ] , X=- a. . a, Z=- c. . c, col or =
  pi nk) : S4;
```



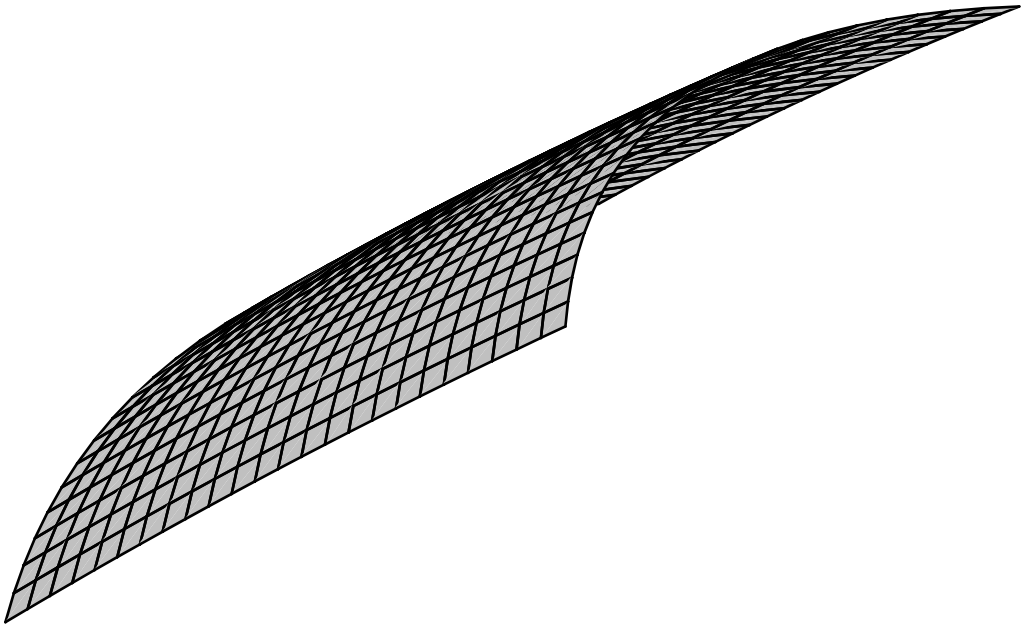
```
> unassi gn( ' Y' ) :
> Y;
```

$$Y \tag{16}$$

```
> Z: =c;
```

$$Z := 0.4 \tag{17}$$

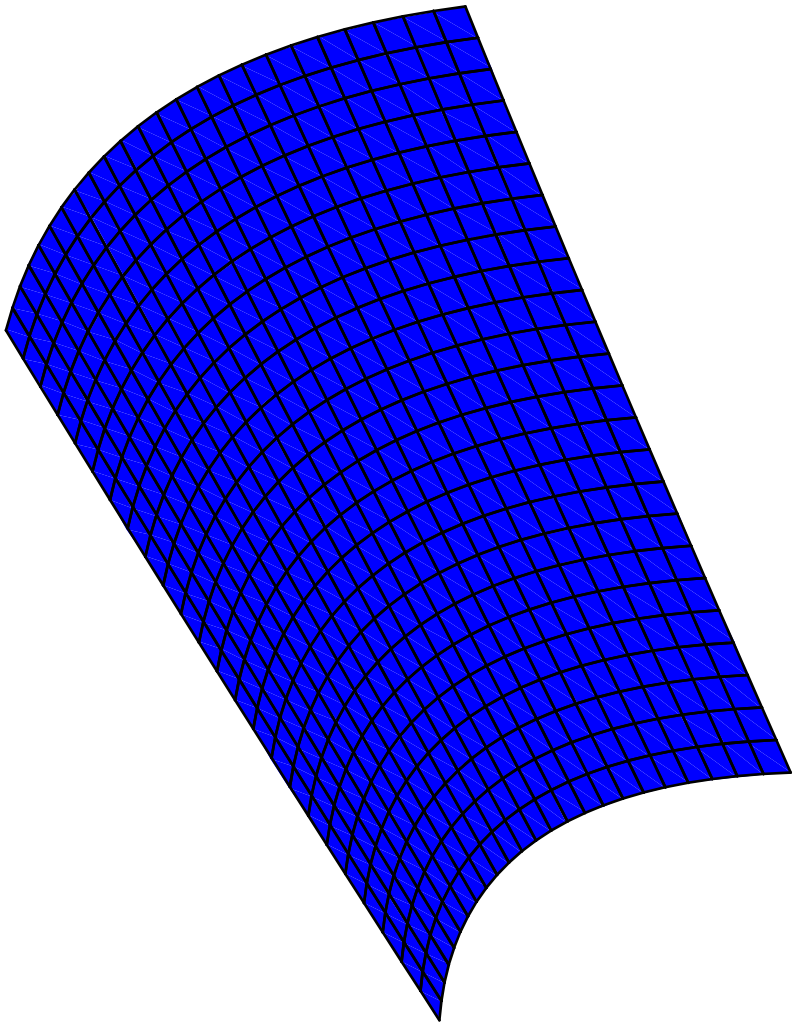
```
> S5: =pl ot 3d( [ x( X, Y, Z) , y( X, Y, Z) , z( X, Y, Z) ] , X=- a. . a, Y=- b. . b, col or =
  gr ey) : S5;
```



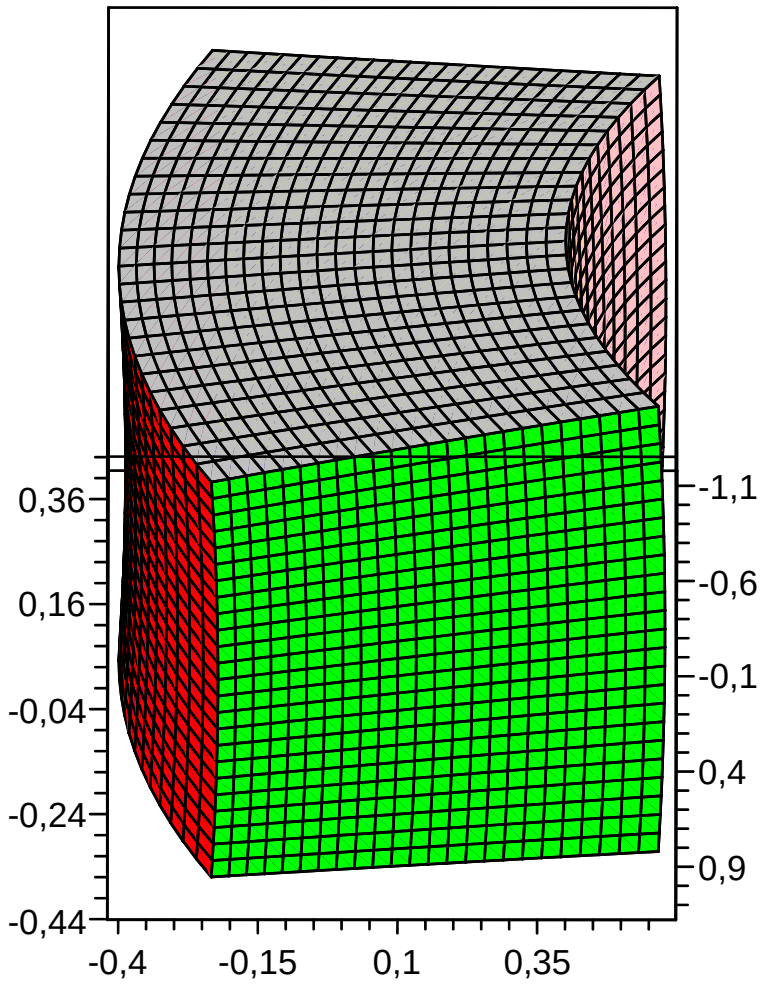
```
> Z: =- c;
>
```

$$Z := -.4 \tag{18}$$

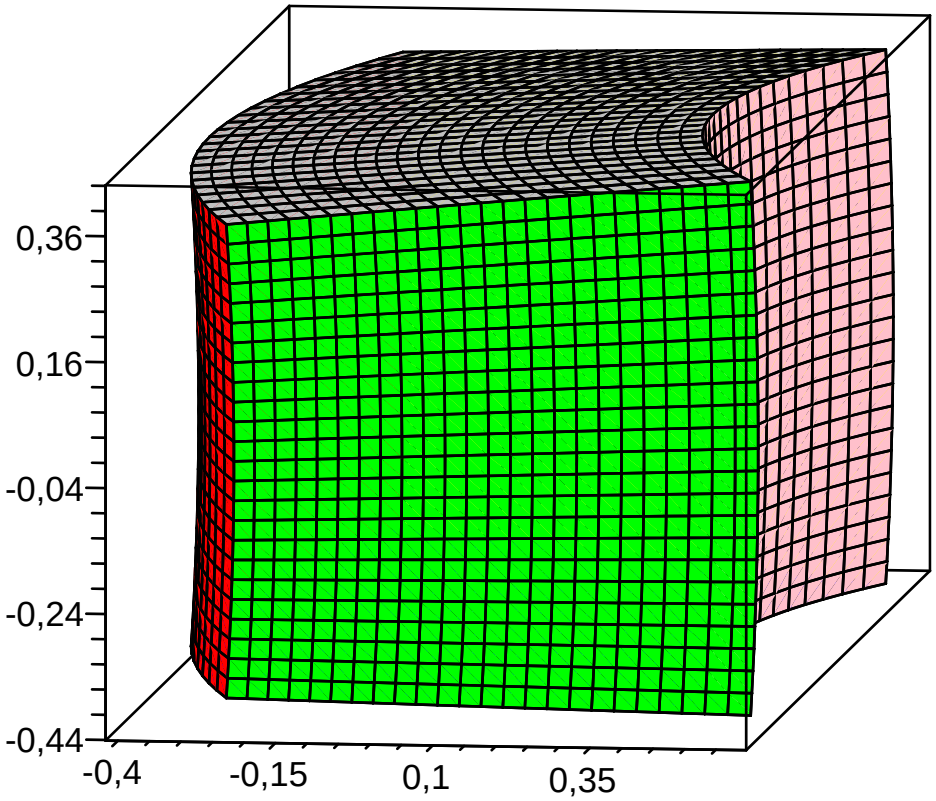
```
> S6: =pl ot 3d( [ x( X, Y, Z) , y( X, Y, Z) , z( X, Y, Z) ] , X=- a. . a, Y=- b. . b, col or =
  bl ue) : S6;
```



```
> display({S1, S2, S3, S4, S5, S6}, axes=box, orientation=[0, 70], scaling=
  constrained);
```




```
> display(S1, S2, S3, S4, S5, S6, axes=box, orientation=[107, 83], scaling=
  constrained);
```


0,36
0,16
-0,04
-0,24
-0,44
-0,4
-0,15
0,1
0,35

>