

Plot af parametriserede mængder

1D-kurve i 2D (planen)

Eksempel i MATH-mode

```
> restart;
```

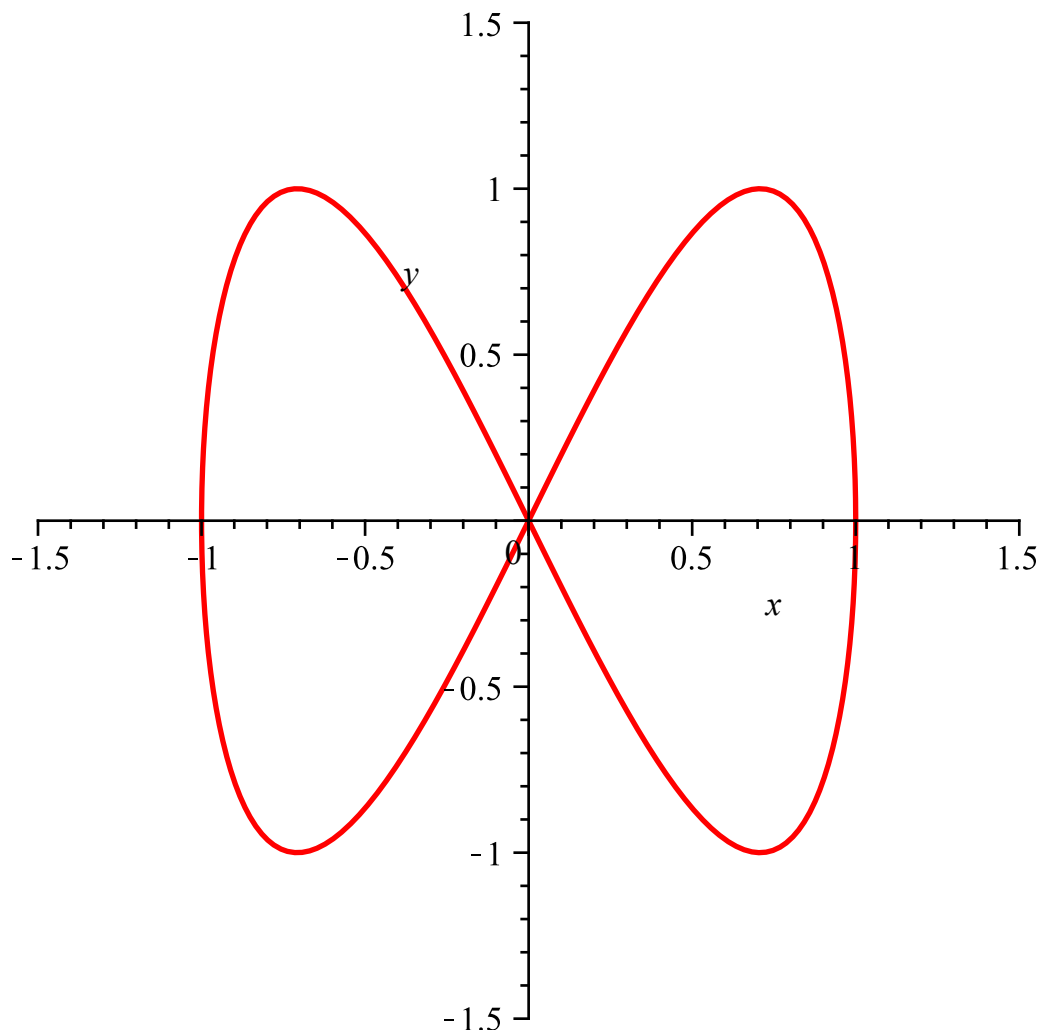
Kurven er givet ved 1 parameter: u .

```
> r := u → ⟨cos(u), sin(2 u)⟩ : r(u);  
u ∈ [0, 2·π];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2u) \end{bmatrix}$$
$$u \in [0, 2\pi]$$

(1.1)

```
> plot([r(u)1, r(u)2, u = 0 .. 2·π], labels = [x, y], view = [-1.5 .. 1.5, -1.5 .. 1.5], thickness = 2);
```



Eksempel i TEXT-mode

```
> restart;
```

Kurven er givet ved 1 parameter: u .

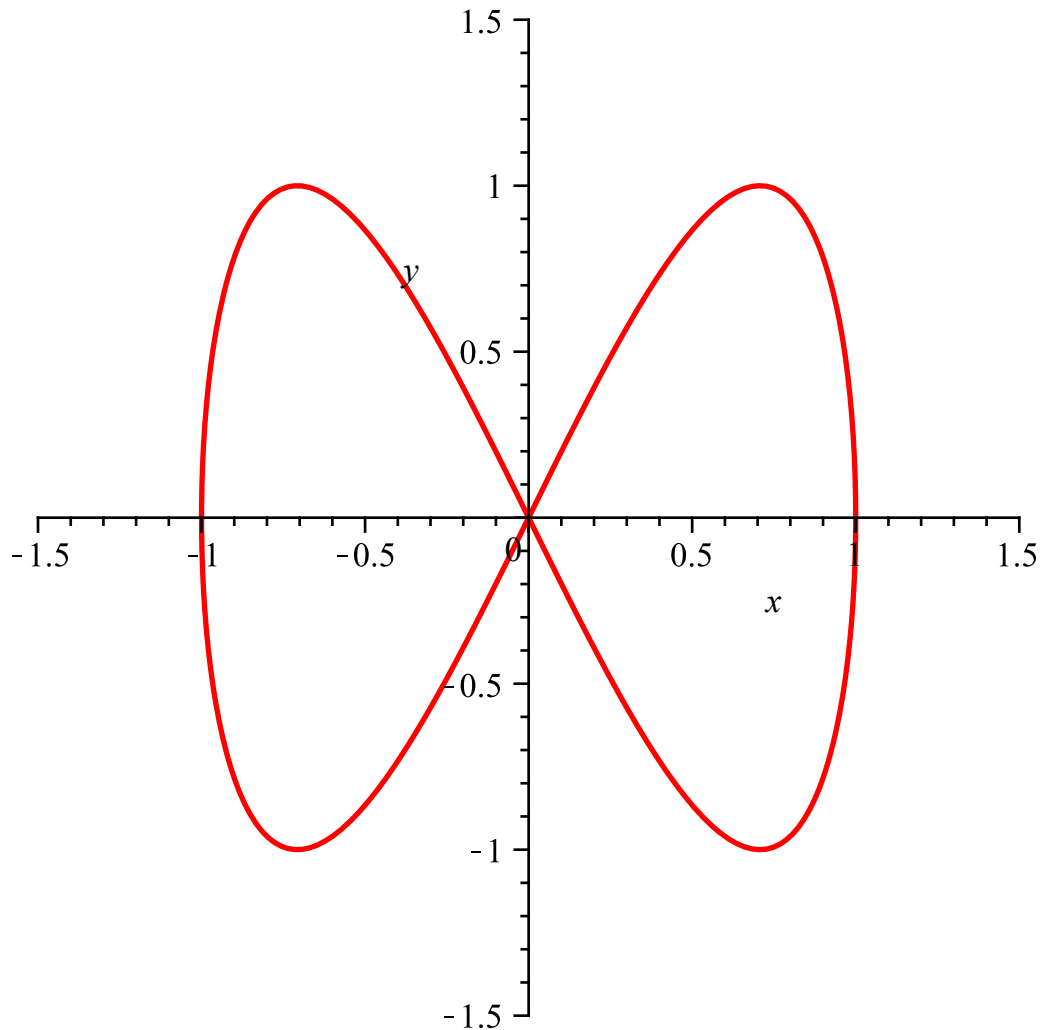
```
> r := u-><cos(u), sin(2*u)>:r(u);
u in [0,2];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2u) \end{bmatrix}$$

$$u \in [0, 2]$$

(1.2)

```
> plot([r(u)[1], r(u)[2], u = 0 .. 2*Pi], labels = [x, y], view
= [-1.5 .. 1.5, -1.5 .. 1.5], thickness = 2);
```



2D-område i 2D (planen)

Eksempel i MATH-mode

```
> restart;
```

Området er givet ved 2 parametre: u og v .

```
> r := (u, v) -> <v*cos(u), v*sin(u)> : r(u, v);
```

$$u \in \left[0, \frac{\pi}{3}\right]; v \in [1, 2];$$

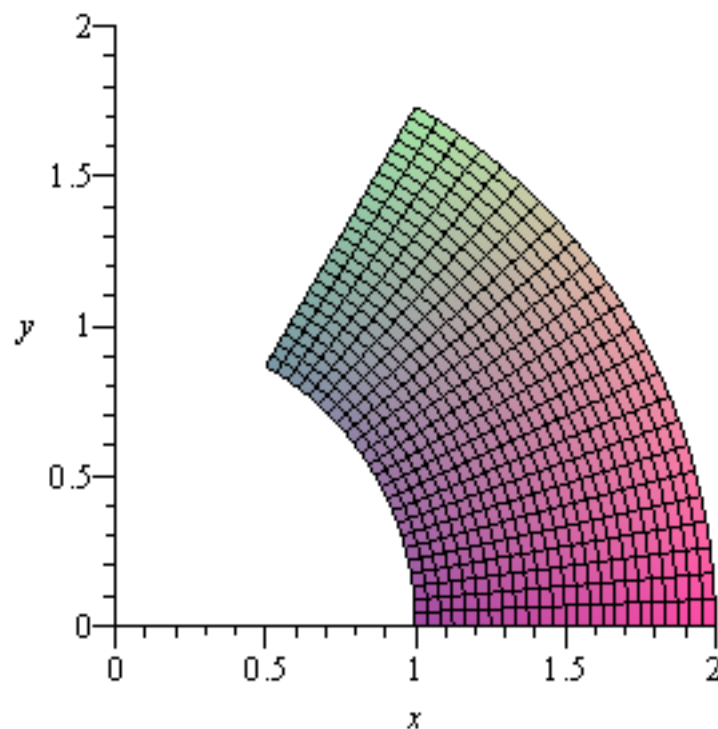
$$\begin{bmatrix} v \cos(u) \\ v \sin(u) \end{bmatrix}$$

$$u \in \left[0, \frac{1}{3} \pi\right]$$

$$v \in [1, 2]$$

(2.1)

```
> plot3d( $\langle r(u, v)_1, r(u, v)_2, 0 \rangle$ ,  $u=0.. \frac{\pi}{3}$ ,  $v=1..2$ , labels = [x, y, " "], axes = normal,
orientation = [-90, 0], view = [0..2, 0..2, -2..2]);
```



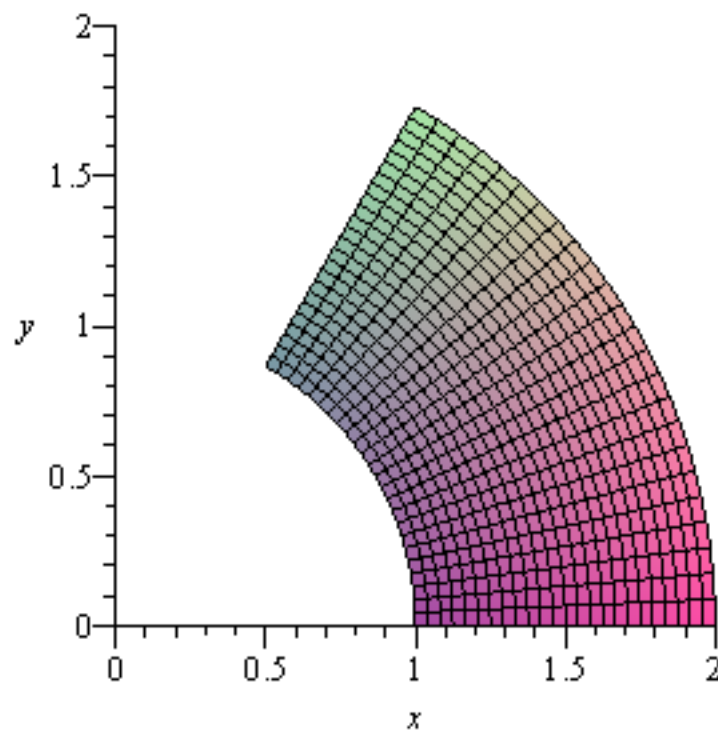
Eksempel i TEXT-mode

Området er givet ved 2 parametre: u og v .

```
> restart;
> r := (u, v) -> <v*cos(u), v*sin(u)>: r(u, v);
u in [0, (1/3)*Pi]; v in [1, 2];
```

$$\begin{aligned} & \begin{bmatrix} v \cos(u) \\ v \sin(u) \end{bmatrix} \\ & u \in \left[0, \frac{1}{3} \pi\right] \\ & v \in [1, 2] \end{aligned} \quad (2.2)$$

```
> plot3d(<r(u, v)[1], r(u, v)[2], 0>, u = 0 .. (1/3)*Pi, v = 1
.. 2, labels = [x, y, " "], axes = normal, orientation =
[-90, 0], view = [0 .. 2, 0 .. 2, -2 .. 2]);
```



▼ 1D-kurve i 3D (rummet)

Eksempel i MATH-mode

Kurven er givet ved 1 parameter: u .

```
> restart;
> r := u → <cos(u), sin(2·u), cos(3·u)> : r(u);
u ∈ [0, 2·π];
```

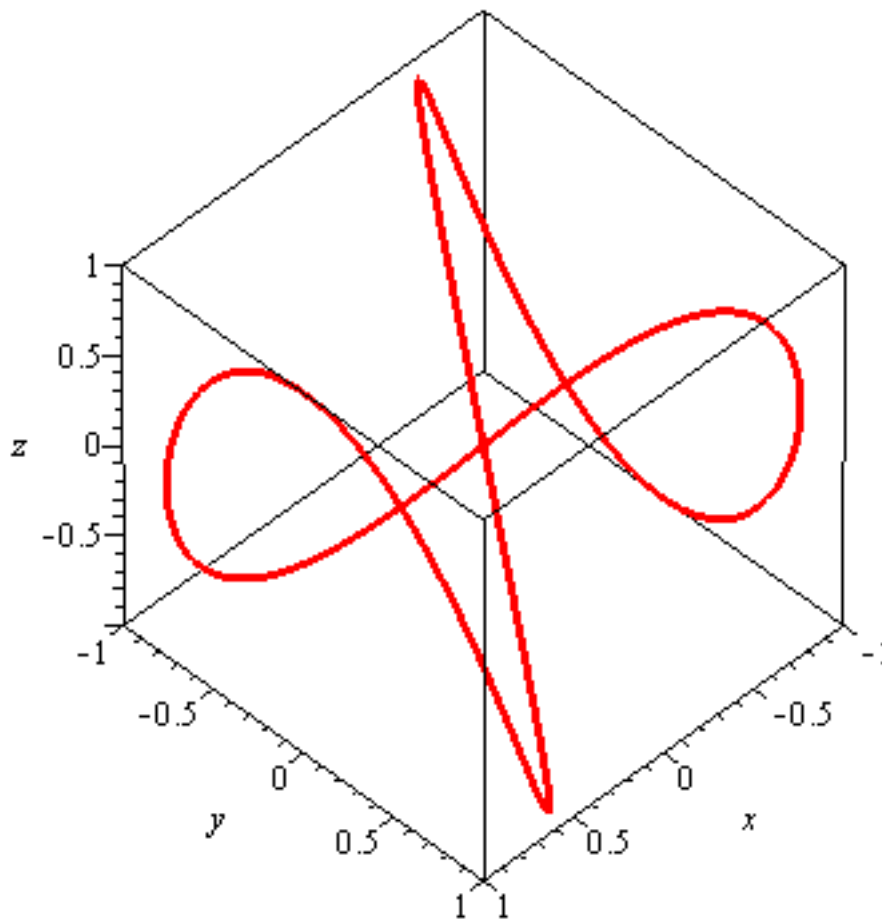
$$\begin{bmatrix} \cos(u) \\ \sin(2u) \\ \cos(3u) \end{bmatrix}$$

$$u \in [0, 2\pi]$$

(3.1)

```
> with(plots) :
```

```
> spacecurve(r(u), u = 0 .. 2 * pi, axes = box, labels = [x, y, z], thickness = 3, view = [-1 .. 1, -1 .. 1, -1 .. 1], color = red, numpoints = 1000);
```



Eksempel i TEXT-mode

Kurven er givet ved 1 parameter: u .

```
> restart;
```

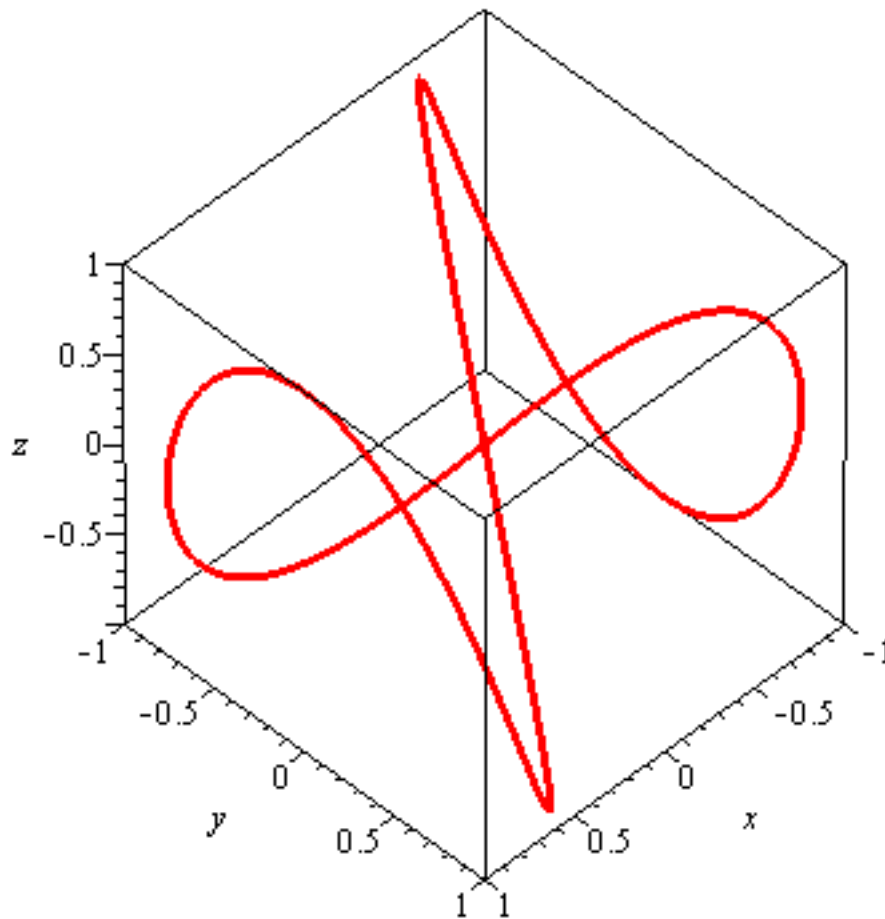
```
> r := u -><cos(u), sin(2*u), cos(3*u)>: r(u);  
u in [0, 2*Pi];
```

$$\begin{bmatrix} \cos(u) \\ \sin(2u) \\ \cos(3u) \end{bmatrix}$$

$$u \in [0, 2\pi]$$

(3.2)

```
> with(plots):
> spacecurve(r(u), u = 0 .. 2*Pi, axes = box, labels = [x, y,
z], thickness = 3, view = [-1 .. 1, -1 .. 1, -1 .. 1], color
= red, numpoints = 1000);
```



▼ 2D-flade i 3D (rummet)

Eksempel i MATH-mode

Fladen er givet ved 2 parametre: u og v .

```
> restart;
```

```
> r := (u, v) -> <v*cos(u), v*sin(u), v^2> : r(u, v);
u ∈ [0, π]; v ∈ [1, 2];
```

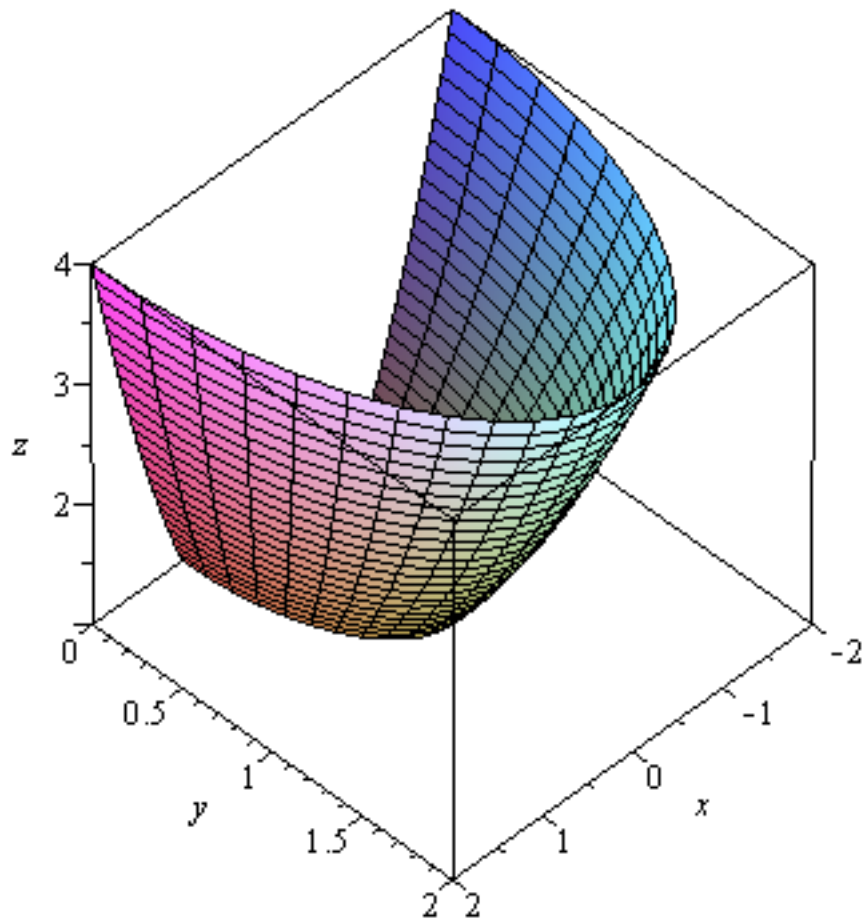
$$\begin{bmatrix} v \cos(u) \\ v \sin(u) \\ v^2 \end{bmatrix}$$

$$u \in [0, \pi]$$

$$v \in [1, 2]$$

(4.1)

```
> plot3d(r(u, v), u = 0 .. pi, v = 1 .. 2, axes = box, labels = [x, y, z]);
```



Eksempel i TEXT-mode

Fladen er givet ved 2 parametre: u og v .

```
> restart;
> r := (u, v) -> <v*cos(u), v*sin(u), v^2>: r(u, v);
u in [0, Pi]; v in [1, 2];
```

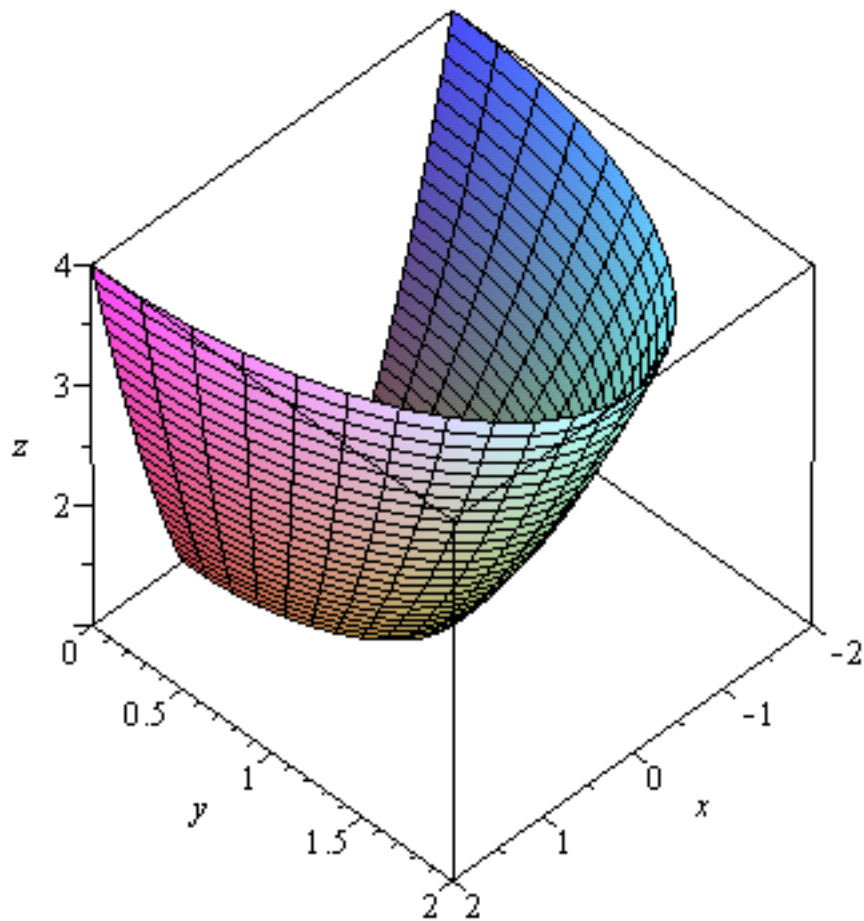
$$\begin{bmatrix} v \cos(u) \\ v \sin(u) \\ v^2 \end{bmatrix}$$

$$u \in [0, \pi]$$

$$v \in [1, 2]$$

(4.2)

```
> plot3d(r(u, v), u = 0 .. Pi, v = 1 .. 2, axes = box, labels = [x, y, z]);
```



3D-område i 3D (rummet)

Eksempel i MATH-mode

Området er givet ved 3 parametre: u , v og w .

∈

> *restart*;

> $r := (u, v, w) \rightarrow \left\langle \sin(u), \cos(u) + v, w \cdot \frac{u}{2} \right\rangle : r(u, v, w);$

$u \in [0, 2 \cdot \pi], v \in [0, 1], w \in [0, 1];$

$$\begin{bmatrix} \sin(u) \\ \cos(u) + v \\ \frac{1}{2} w u \end{bmatrix}$$

$u \in [0, 2 \pi], v \in [0, 1], w \in [0, 1]$

(5.1)

> *with(plots)* :

> *with(Integrator8)* :


```
> B := [0, 2 * pi, 0, 1, 0, 1];
```

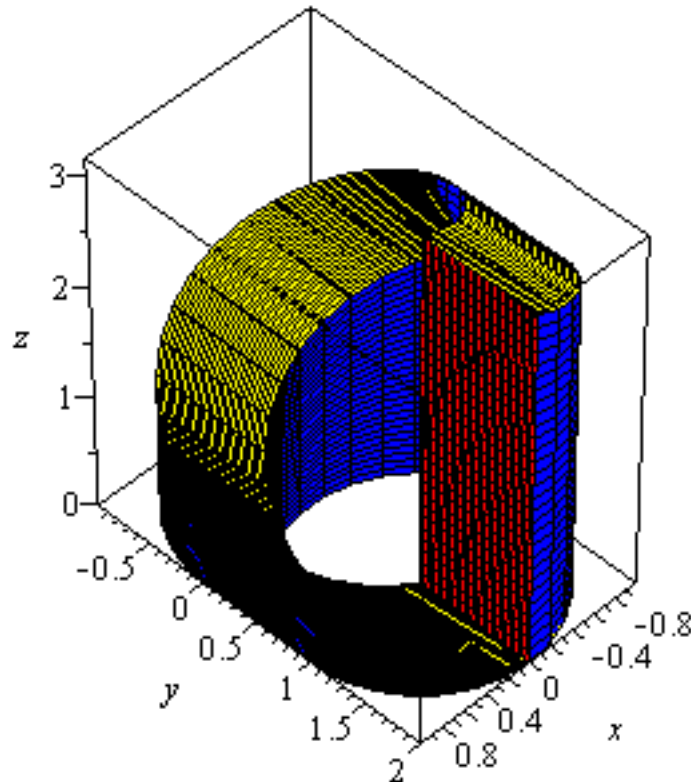
$$B := [0, 2\pi, 0, 1, 0, 1] \quad (5.2)$$

```
> net := [10, 10, 10];
```

$$net := [10, 10, 10] \quad (5.3)$$

```
> plot1 := Integrator8[sideFlader](r, B, net) :
```

```
> display(plot1, axes = box, labels = [x, y, z]);
```



Eksempel i TEXT-mode

Området er givet ved 3 parametre: u , v og w .

```
> restart;
```

```
> r := (u, v, w) -> <sin(u), cos(u)+v, (1/2)*w*u>: r(u, v, w);  
u in [0, 2*Pi], v in [0, 1], w in [0, 1];
```

$$\begin{bmatrix} \sin(u) \\ \cos(u) + v \\ \frac{1}{2} w u \end{bmatrix}$$

$$u \in [0, 2\pi], v \in [0, 1], w \in [0, 1]$$

(5.4)

```
> with(plots):  
> with(Integrator8):  
> B := [0, 2*Pi, 0, 1, 0, 1];  
      B := [0, 2 π, 0, 1, 0, 1] (5.5)  
> net := [10, 10, 10];  
      net := [10, 10, 10] (5.6)  
> plot1 := Integrator8[sideFlader](r, B, net):  
> display(plot1, axes = box, labels = [x, y, z]);
```

