Uge 6, F13, LilleDag (plot af rumlige områder)

Opgave 1

```
> restart
```

```
> r := (u, v, w) → ⟨ 1/2 · (u^2 − v^2), u·v, w ⟩ : r(u, v, w)
```

$$\begin{bmatrix} \frac{1}{2}\,u^2 - \frac{1}{2}\,v^2 \\ u\,v \\ w \end{bmatrix} \tag{1.1.1}$$

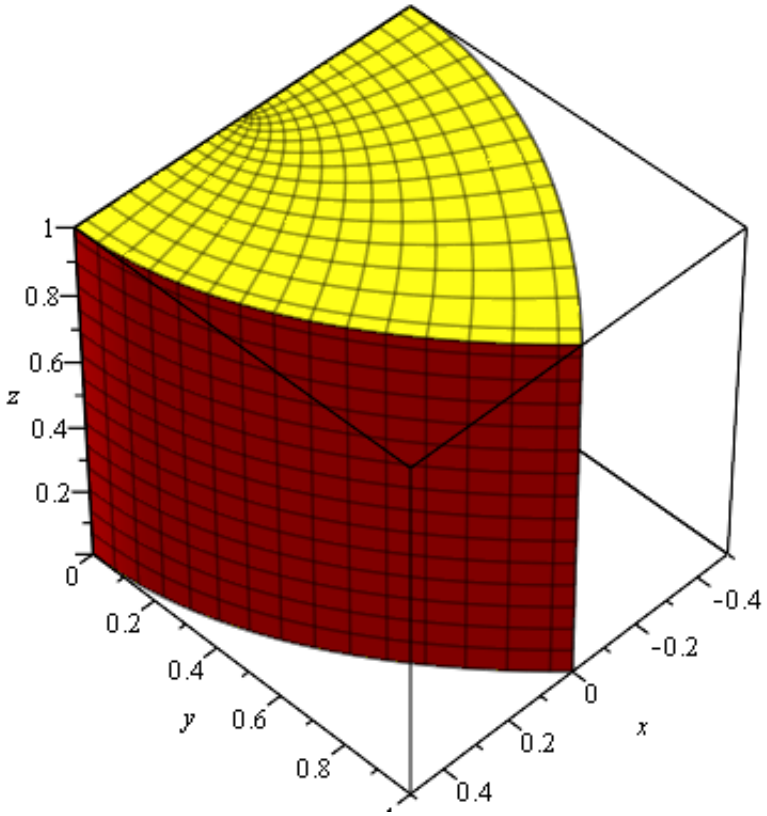
```
> B := [0, 1, 0, 1, 0, 1]
```

$$B := [0, 1, 0, 1, 0, 1] \tag{1.1.2}$$

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

$$net := [10, 10, 10] \tag{1.1.3}$$

```
> plot1 := Integrator8[sideFlader](r, B, net) :
> plots[display](plot1, axes = boxed, labels = [x, y, z])
```



Opgave 2

a)

```
> restart
> h := (x, y) → x^2 + y
```

$$h := (x, y) \to x^2 + y \qquad \textbf{(1.2.1.1)}$$

```
> r := (u, v, w) → ⟨u, v, w·h(u, v)⟩ : r(u, v, w)
```

$$\begin{bmatrix} u \\ v \\ w\,(u^2 + v) \end{bmatrix} \qquad \textbf{(1.2.1.2)}$$

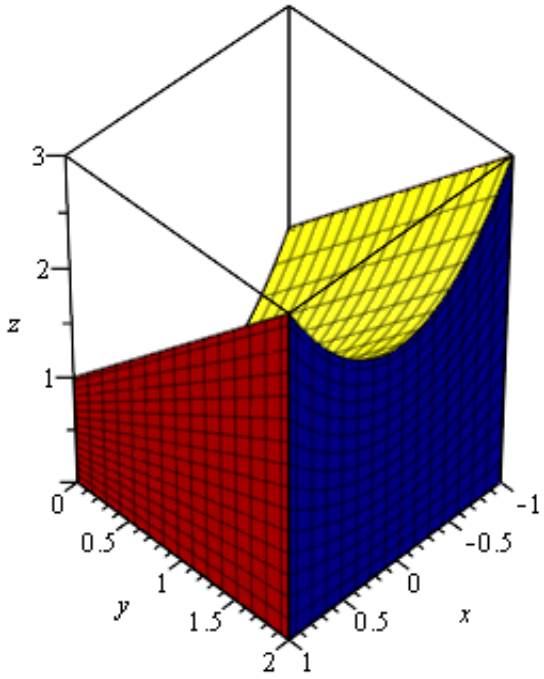
```
> B := [-1, 1, 0, 2, 0, 1]
```

$$B := [-1, 1, 0, 2, 0, 1] \qquad \textbf{(1.2.1.3)}$$

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

$$net := [10, 10, 10] \qquad \textbf{(1.2.1.4)}$$

```
> plot1 := Integrator8[sideFlader](r, B, net) :
> plots[display](plot1, axes = boxed, labels = [x, y, z])
```



b)

> $x := (u, v) \to u \cdot \cos(v) + 1$

$$x := (u, v) \to u \cos(v) + 1 \qquad \textbf{(1.2.2.1)}$$

> $y := (u, v) \to u \cdot \sin(v)$

$$y := (u, v) \to u \sin(v) \qquad \textbf{(1.2.2.2)}$$

> $r2 := (u, v, w) \to \langle x(u, v), y(u, v), w \cdot h(x(u, v), y(u, v)) \rangle : r2(u, v, w)$

$$\begin{bmatrix} u \cos(v) + 1 \\ u \sin(v) \\ w \left((u \cos(v) + 1)^2 + u \sin(v) \right) \end{bmatrix} \qquad \textbf{(1.2.2.3)}$$

> $B := \left[0, 1, 0, \frac{\pi}{2}, 0, 1\right]$

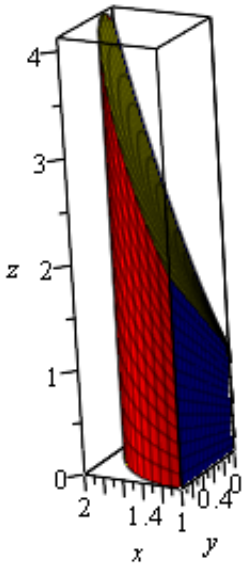
$$B := \left[0, 1, 0, \frac{1}{2}\pi, 0, 1\right] \qquad \textbf{(1.2.2.4)}$$

> $net := [5, 5, 5]$

$$net := [5, 5, 5] \qquad \textbf{(1.2.2.5)}$$

> $plot1 := Integrator8[sideFlader](r2, B, net) :$

```
> plots[display](plot1, axes = boxed, labels = [x, y, z])
```



Opgave 3

a)

```
> restart
> s := (u, v) → ⟨u, 0, v·(1 − u)⟩ : s(u, v)
```

$$\begin{bmatrix} u \\ 0 \\ v\,(1-u) \end{bmatrix} \qquad \textbf{(1.3.1.1)}$$

```
> Rz := θ → [cos(θ), -sin(θ), 0; sin(θ), cos(θ), 0; 0, 0, 1] : Rz(θ)
```

(1.3.1.2)

$$\begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix} \quad \textbf{(1.3.1.2)}$$

> $r := (u, v, w) \to Rz(w).s(u, v) : r(u, v, w)$

$$\begin{bmatrix} \cos(w)\ u \\ \sin(w)\ u \\ v\ (1 - u) \end{bmatrix} \quad \textbf{(1.3.1.3)}$$

> $B := [0, 1, 0, 1, -\pi, \pi]$

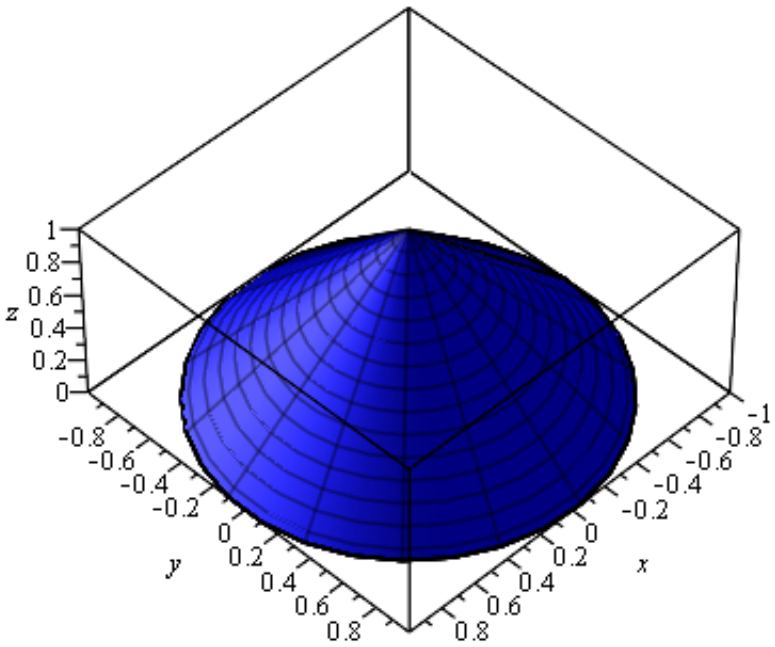
$$B := [0, 1, 0, 1, -\pi, \pi] \quad \textbf{(1.3.1.4)}$$

> $net := [10, 10, 10]$

$$net := [10, 10, 10] \quad \textbf{(1.3.1.5)}$$

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

> $plots[display](plot1, axes = boxed, labels = [x, y, z])$



> $Integrator8[rumIntGo](r, B, 1, net);$

(1.3.1.6)

$$\frac{1}{3}\,\pi \qquad \textbf{(1.3.1.6)}$$

b)

> $r2 := (u, v, w) \to \langle u\cdot\sin(v)\cdot\cos(w), u\cdot\sin(v)\cdot\sin(w), u\cdot\cos(v)\rangle : r2(u, v, w)$

$$\begin{bmatrix} \sin(v)\ u\cos(w) \\ \sin(v)\ u\sin(w) \\ \cos(v)\ u \end{bmatrix} \qquad \textbf{(1.3.2.1)}$$

> $B := [0, 1, 0, \pi, -\pi, \pi]$

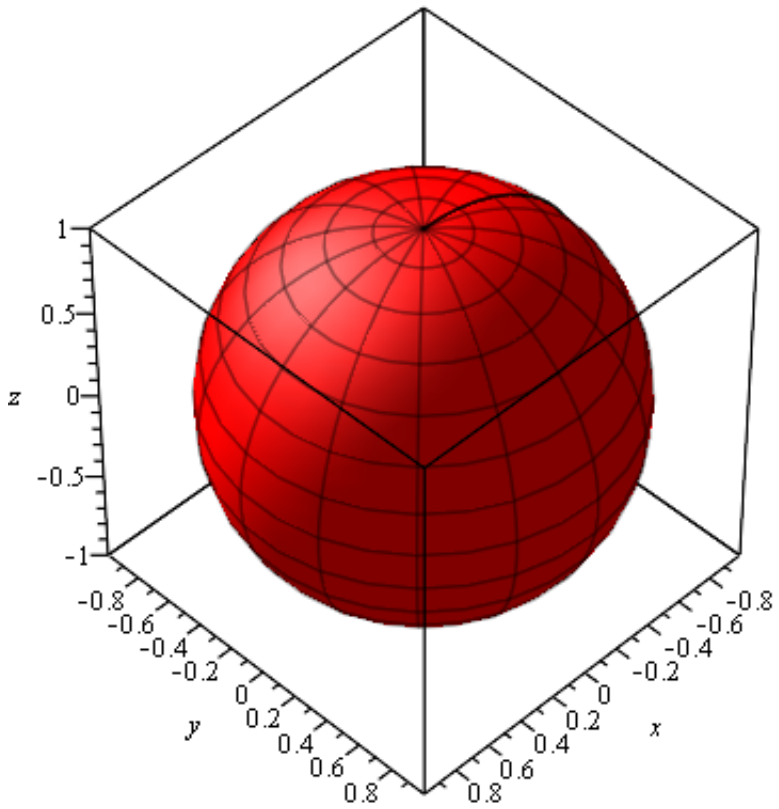
$$B := [0, 1, 0, \pi, -\pi, \pi] \qquad \textbf{(1.3.2.2)}$$

> $net := [10, 10, 10]$

$$net := [10, 10, 10] \qquad \textbf{(1.3.2.3)}$$

> $plot1 := Integrator8[sideFlader](r2, B, net) :$

> $plots[display](plot1, axes = boxed, labels = [x, y, z])$



> $f := (x, y, z) \to (x\cdot y\cdot z)^2 : f(x, y, z)$

$$x^2 y^2 z^2 \qquad \textbf{(1.3.2.4)}$$

> $Integrator8[rumIntGo](r2, B, f, net)$

$$\frac{4}{945}\,\pi \qquad \textbf{(1.3.2.5)}$$

> *Integrator8*[*rumCmGo*](*r2*, *B*, *f*)

$$[0, 0, 0] \qquad \textbf{(1.3.2.6)}$$

Ekstra: udsnit af kugle

> $B2 := \left[0, 1, 0, \frac{\pi}{2}, 0, \frac{\pi}{3}\right]$

$$B2 := \left[0, 1, 0, \frac{1}{2}\,\pi, 0, \frac{1}{3}\,\pi\right] \qquad \textbf{(1.3.2.7)}$$

> *plot1* := *Integrator8*[*sideFlader*](*r2*, *B2*, *net*) :
> *plots*[*display*](*plot1*, *axes* = *boxed*, *labels* = [*x*, *y*, *z*])