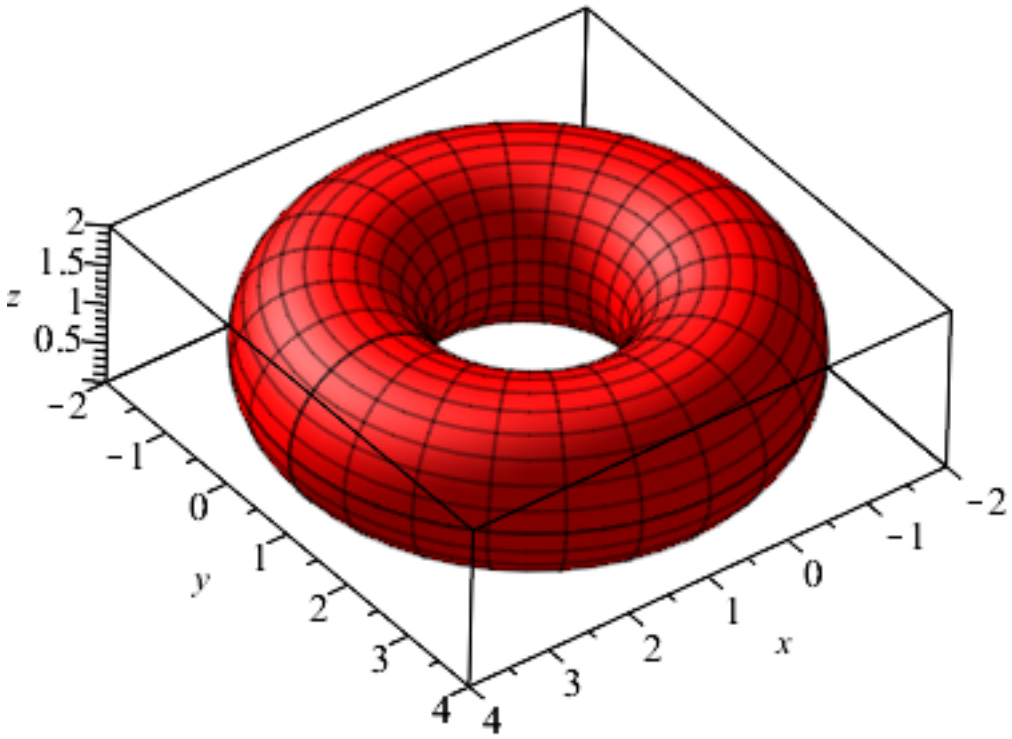
Torus til 3D-print

```
restart
with(plots) :
with(plottools) :
```

Tegnet direkte i Maple

```
Torus := display(torus([1, 1, 1], 1, 2), color = red, labels = [x, y, z], scaling = constrained)
```



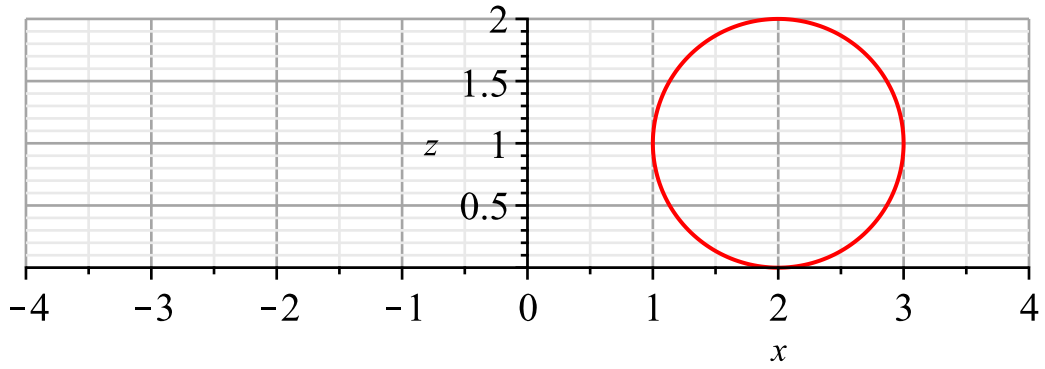
Lavet via parametrisering

```
r(u) := ⟨1·cos(u) + 2, 0, 1·sin(u) + 1⟩ :
```

$$r(u) = \begin{bmatrix} \cos(u) + 2 \\ 0 \\ \sin(u) + 1 \end{bmatrix}$$

Med parameterområdet $u \in [0; 2 \cdot \pi]$

```
plot([r(u)[1], r(u)[3], u = 0..2·π], color = red, gridlines, labels = [x, z], view = [-4..4, 0..2],
    scaling = constrained)
```



Rotation om z-aksen:
https://en.wikipedia.org/wiki/Rotation_matrix#In_three_dimensions

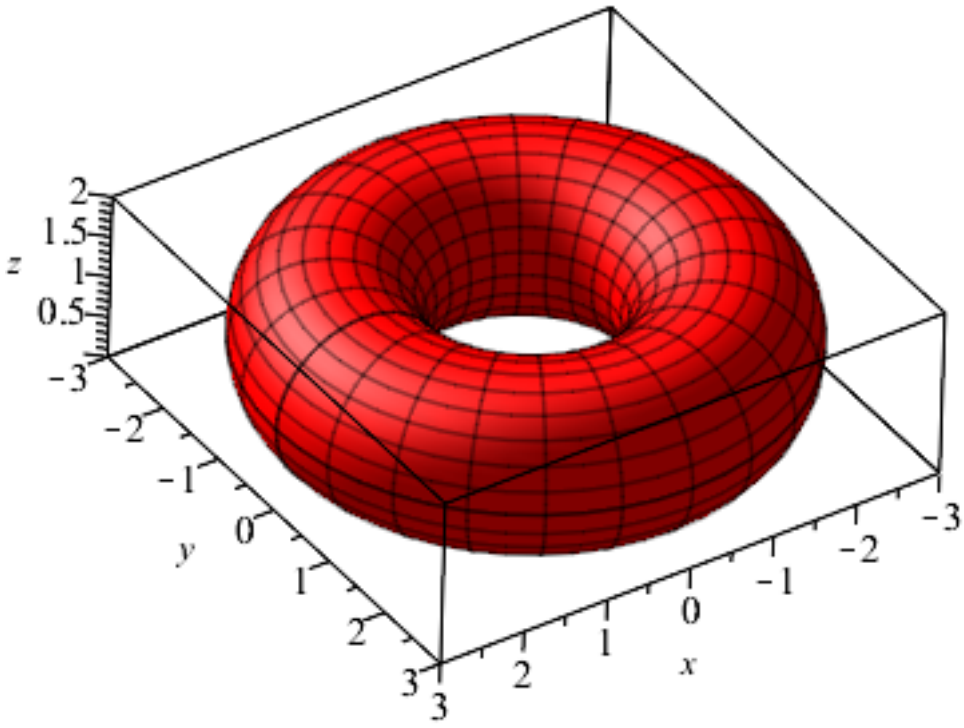
$$R_z(\theta) := \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix}:$$

$$t(u, v) := R_z(v).r(u):$$

$$t(u, v) = \begin{bmatrix} \cos(v)\ (\cos(u) + 2) \\ \sin(v)\ (\cos(u) + 2) \\ \sin(u) + 1 \end{bmatrix}$$

Med parameterområdet: $u \in [0; 2\cdot\pi]$ og $v \in [0; 2\cdot\pi]$

$plot3d(t(u, v), u = 0..2\cdot\pi, v = 0..2\cdot\pi, color = red, labels = [x, y, z], scaling = constrained)$



Genererer en binær STL-fil med torus'en:

Export("torus.stl", *Torus*, *base* = *homedir*)

230484 **(1)**