

# Gherkin bygningen i London

<http://justfunfacts.com/interesting-facts-about-the-gherkin/>

*restart*

*with(plots) :*

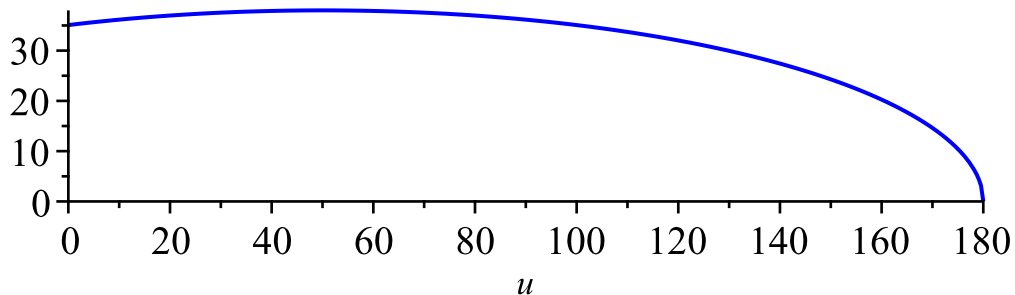
## Parametrisering:

Frembringerkurve:

**Kurven stammer fra en eksamensopgave STX.**

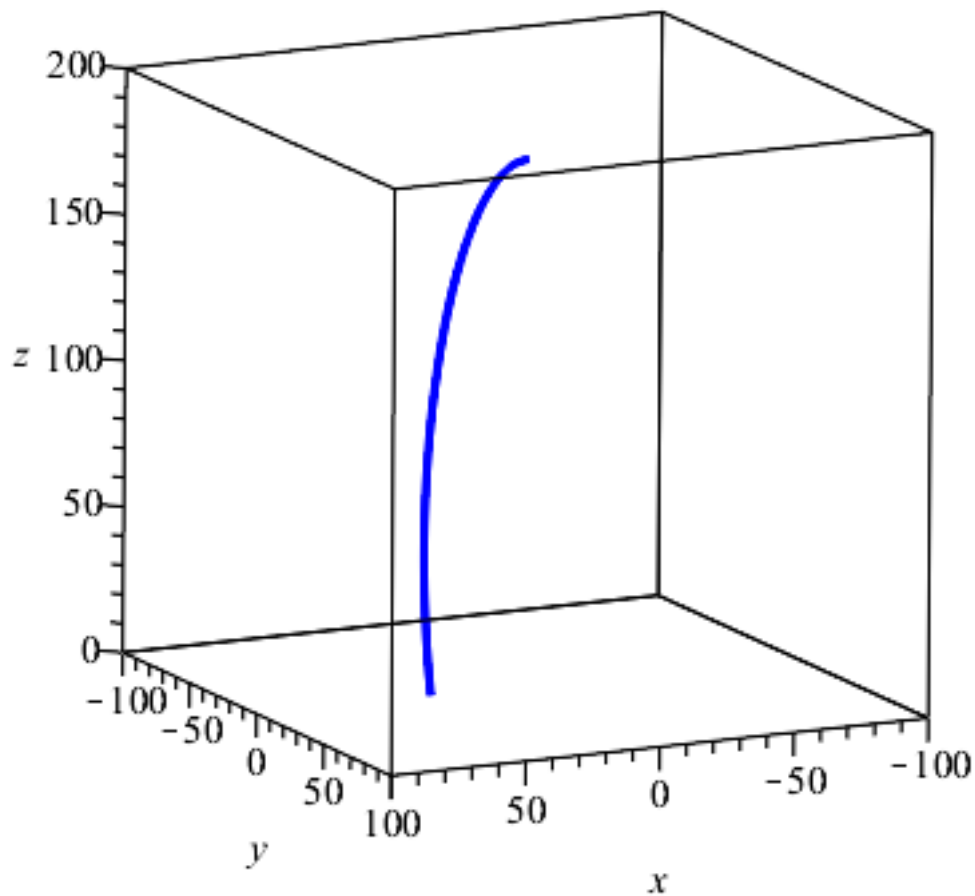
$$s(u) := 19 \cdot \frac{\sqrt{-u^2 + 100 \cdot u + 14400}}{65} :$$

*plot(s(u), u = 0 ..180, scaling = constrained, color = blue)*



$$p(u) := \langle s(u), 0, u \rangle :$$

*S := spacecurve(p(u), u = 0 ..180, color = blue, thickness = 3, view = [ -100 ..100, -100 ..100, 0 ..200 ], labels = [x, y, z])*



### Rotation om z-aksen:

[https://en.wikipedia.org/wiki/Rotation\\_matrix#In\\_three\\_dimensions](https://en.wikipedia.org/wiki/Rotation_matrix#In_three_dimensions)

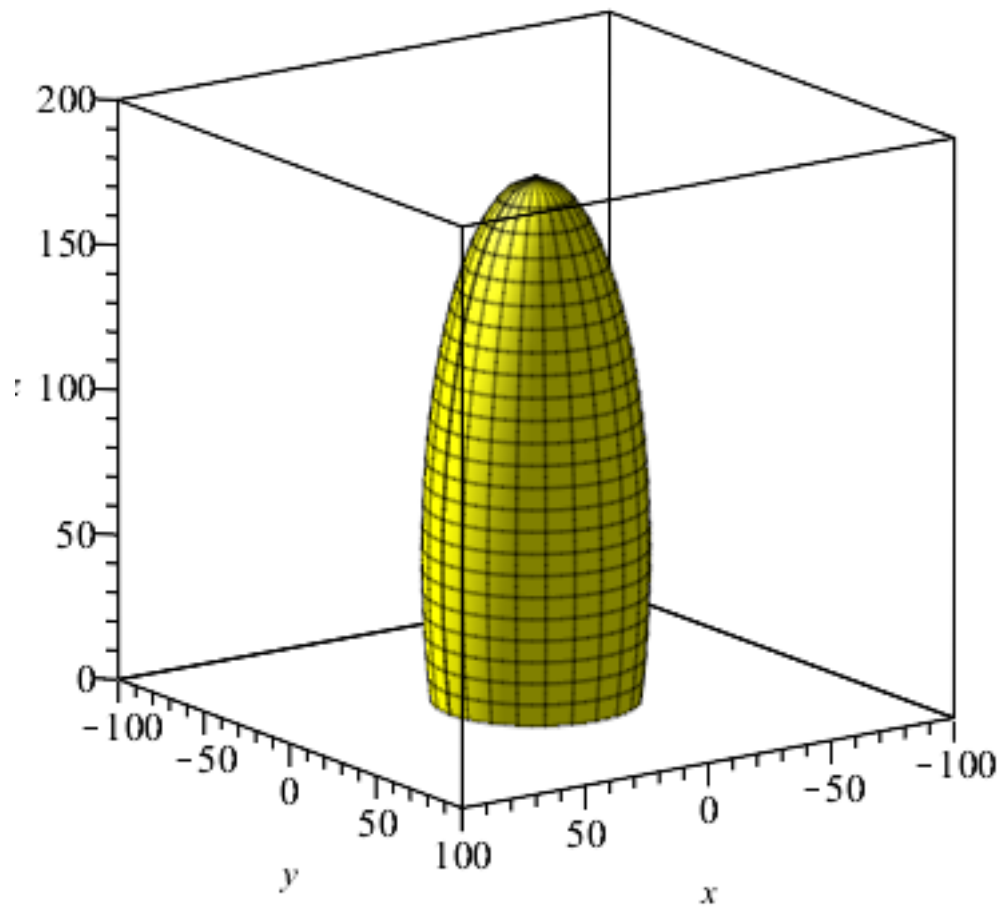
$$Rotation_z(\theta) := \begin{bmatrix} \cos(\theta) & -\sin(\theta) & 0 \\ \sin(\theta) & \cos(\theta) & 0 \\ 0 & 0 & 1 \end{bmatrix} :$$

### Parametrisering af bygningens krumme overflade:

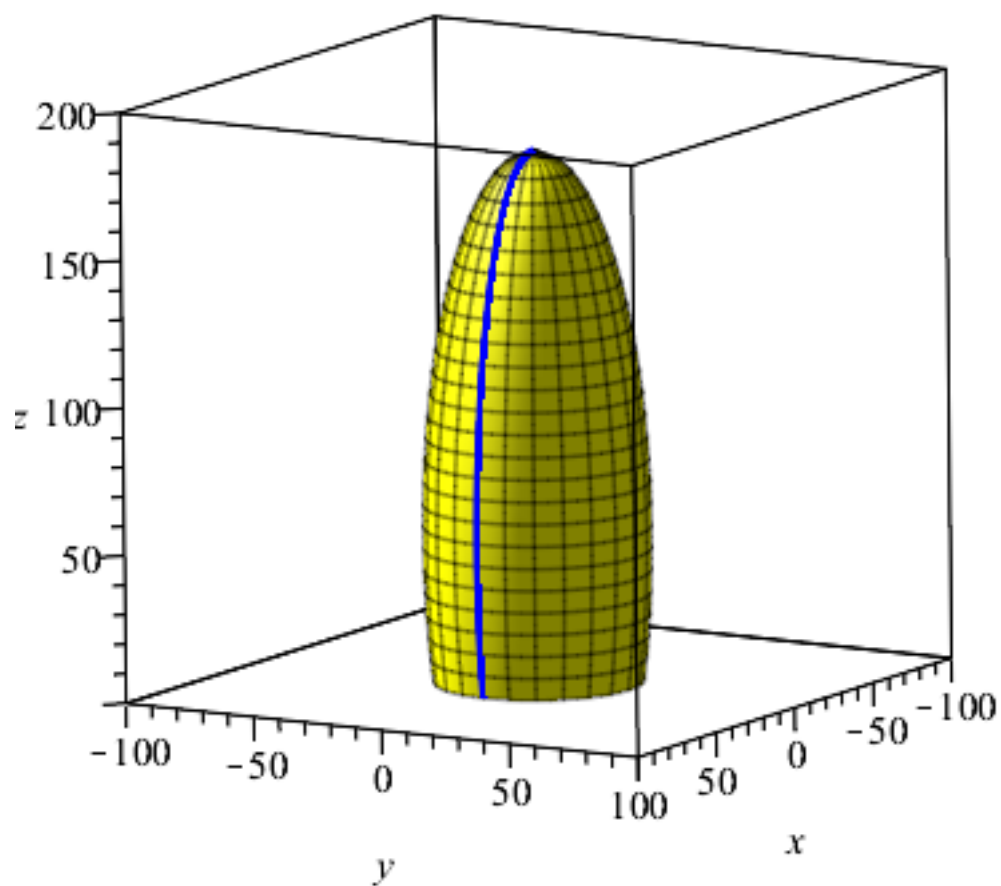
$$r(u, v) := Rotation_z(v) \cdot p(u) :$$

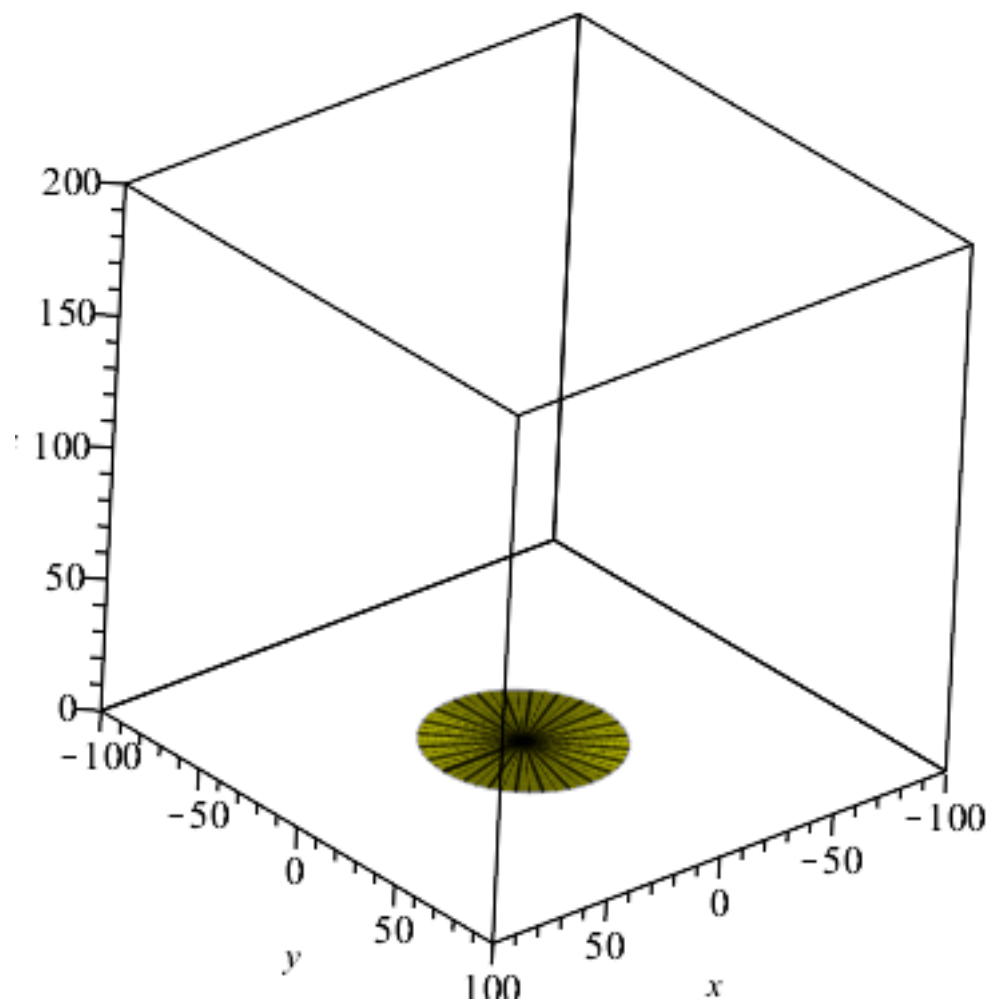
$$r(u, v) = \begin{bmatrix} \frac{19 \cos(v) \sqrt{-u^2 + 100u + 14400}}{65} \\ \frac{19 \sin(v) \sqrt{-u^2 + 100u + 14400}}{65} \\ u \end{bmatrix}$$

$$G := plot3d(r(u, v), u = 0 .. 180, v = 0 .. 2 \cdot \pi, view = [-100 .. 100, -100 .. 100, 0 .. 200], color = yellow, labels = [x, y, z])$$

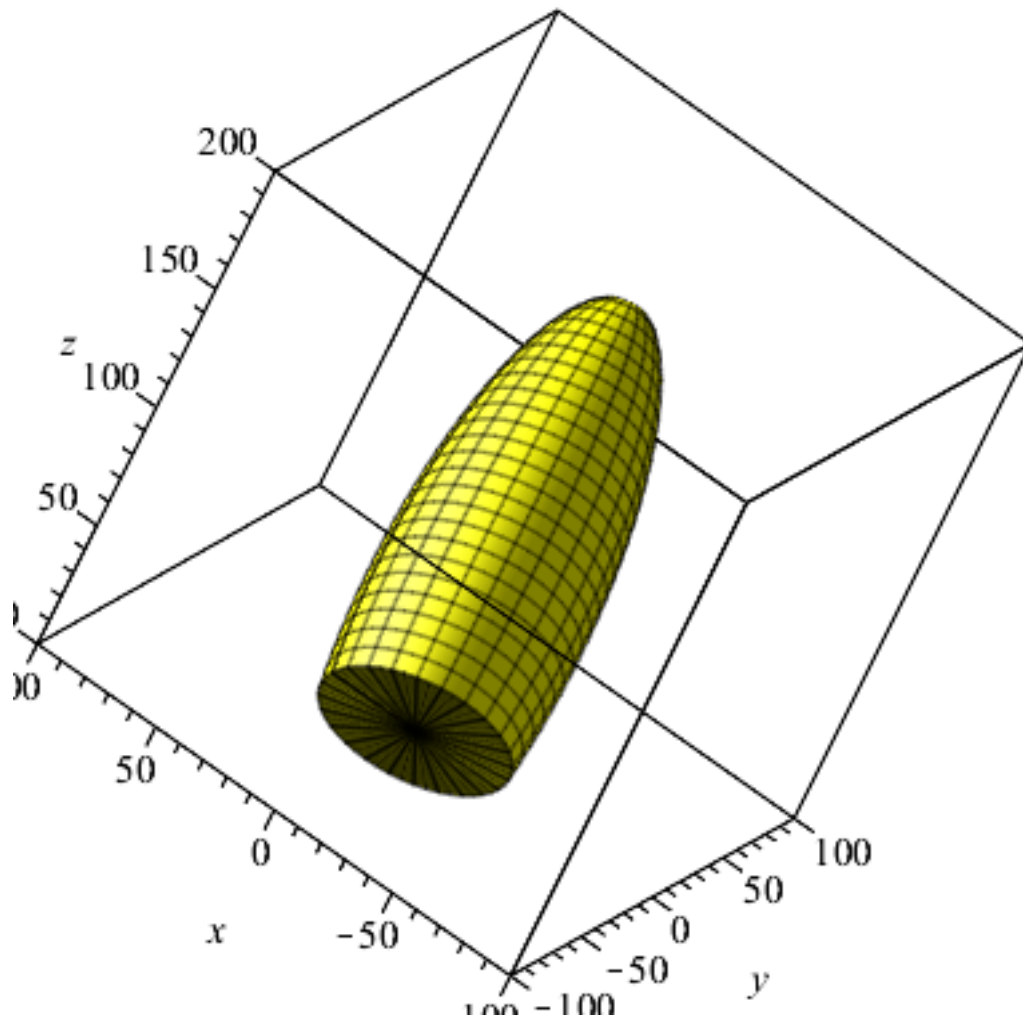


*display(S, G)*

**Parametrisering af bunden af bygningen:**
$$b(u, v) := \langle s(0) \cdot v \cdot \cos(u), s(0) \cdot v \cdot \sin(u), 0 \rangle :$$
$$B := \text{plot3d}(b(u, v), u = 0 .. 2 \cdot \pi, v = 0 .. 1, \text{view} = [-100 .. 100, -100 .. 100, 0 .. 200], \text{color} = \text{yellow}, \text{labels} = [x, y, z])$$



*gherkin := display(G, B)*



**Fremstilling af STL-fil:**

`Export("gherkin.stl", gherkin, base = homedir)`

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(1)