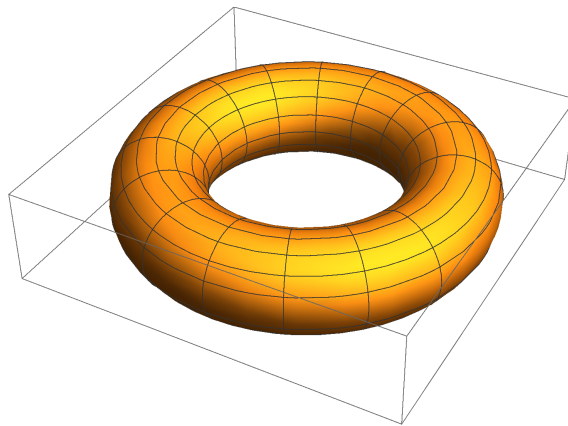


Problem set – Week 5

SURFACES OF SOLIDS OF REVOLUTION, PARTIAL DERIVATIVES

1. Consider the parabolic segment $y = x^2$ between $x = 1$ and $x = 2$. Find the (one-sided) surface area obtained when this parabolic segment is revolved around
 - (a) the x -axis.
 - (b) the y -axis.
2. Compute the surface area of a *torus* (pictured), where the radial cross sections are circles with radius 1, and the centers of these circles trace out a circle of radius 3. (So, the hole in the middle has a radius of 2, and the entire object has a radius of 4. (this was the same object you computed the volume of last week).



3. For each of the following functions, sketch the surface $z = f(x, y)$ and a typical level curve.
 - (a) $f(x, y) = y^2$
 - (b) $f(x, y) = 1 - |x| - |y|$
 - (c) $f(x, y) = \sqrt{x^2 + y^2 - 4}$

For each of the following functions, sketch a typical level surface.

(d) $f(x, y, z) = \ln(x^2 + y^2 + z^2)$

(e) $f(x, y, z) = z$

(f) $f(x, y, z) = x^2 + y^2$

4. Compute the partial derivatives f_x and f_y for the following functions.

(a) $f(x, y) = xy^2 + yx^3$

(b) $f(x, y) = \sqrt{x + xy + 1}$

(c) $f(x, y) = x^y$