MAT137 - Calculus with proofs

- Assignment 7 due on February 25
- Assignment 8 due on March 4
- Test 4 opens on March 12

- TODAY: More volumes
- Unit 10 practice problems: other applications

- FRIDAY: Sequences (**Watch Videos 11.1, 11.2**)

Let R be the region in the first quadrant bounded between the curves with equations $y = x^3$ and $y = \sqrt{32x}$.
Compute the volume of the solid of revolution obtained by rotating R around...

1. ... the y-axis
2. ... the line $x = -2$

Compute each volume twice:

(a) first integrating with respect to y
(b) then integrating with respect to x

Doughnut

Let R be the region inside the curve with equation

$$(x - 1)^2 + y^2 = 1.$$

Rotate R around the line with equation $y = 4$. The resulting solid is called a *torus*.

1. Draw a picture and convince yourself that a torus looks like a doughnut.
2. Set up the volume of the torus as an integral using x as the variable ("cylindrical shell method"). You do not need to compute the integral.
3. Set up the volume of the torus as an integral using y as the variable ("carrot method"). You do not need to compute the integral.

Challenge

Two long cylinders have the same radius R and their axes are perpendicular. Find the volume of their intersection.

Hint: You can slice the resulting solid by parallel cuts in three different directions. One of the three makes the problem much, much simpler than the other two.