



Calculus / 3D Geometry



The volume can be found by adding the volume of the 2 cylinders then subtracting the intersection volume.

We see that the intersection is a shape formed from squares.

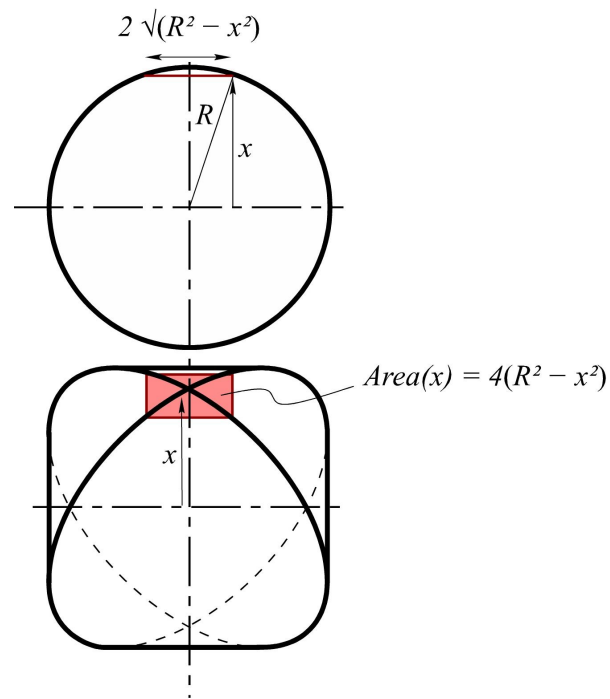
$\frac{1}{2}$ sidelength at height $x = \sqrt{R^2 - x^2}$

Volume of intersection: $\sum 4(R^2 - x^2) \Delta x$

Infinitesimal: $\int 4(R^2 - x^2) dx$

We can solve this analytically using calculus techniques, or since we know that we are solving from $x = -R$ to $x = R$, we could use the integration function on most scientific calculators.

Volume = $16R^3/3 = 144$





Numerical integration



x	$2\sqrt{(r^2 - x^2)}$	$4(r^2 - x^2)\Delta x$		1	3
-3	0	0	Δx	r	
-2	2.236067977	20			
-1	2.828427125	32			
0	3	36			
1	2.828427125	32			
2	2.236067977	20			
3	0	0			
		Trapezoid rule sum:			
		140			



