

1 Hyperball vs Hypercube

1.1 Volume of hyperball:

for $n = 2k$

$$V_{2k}(R) = \frac{\pi^{2k}}{k!} R^{2k} \quad (1)$$

for $n = 2k + 1$

$$V_{2k+1}(R) = \frac{2(k!)(4\pi)^{2k+1}}{(2k+1)!} R^{2k+1} \quad (2)$$

1.2 Volume of hypercube:

for hyper cube with edge length of 'a':

$$V_n(a) = a^n \quad (3)$$

1.3 Answer

$a = 2.0$ and $R = 1.0$:

1.3.1 $n = 2k$

$$\frac{\text{Hyperball volume}}{\text{Hypercube Volume}} * 100\% = \frac{\pi^2 k}{k! 2^{2k}} * 100\% \quad (4)$$

1.3.2 $n = 2k + 1$

$$\frac{\text{Hyperball volume}}{\text{Hypercube Volume}} * 100\% = \frac{\pi^2 k}{k! 2^{2k}} * 100\% \quad (5)$$