

THE DISK METHOD

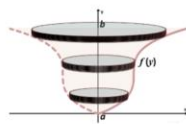
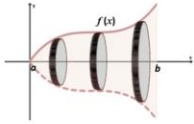
To find the volume of a solid of revolution with the disk method, use one of the following:

Horizontal Axis of Revolution

$$\text{Volume} = V = \pi \int_a^b [R(x)]^2 dx$$

Vertical Axis of Revolution

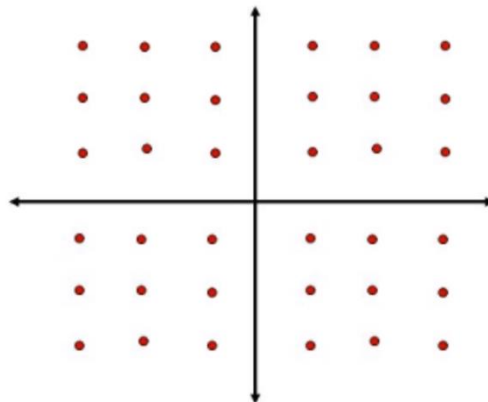
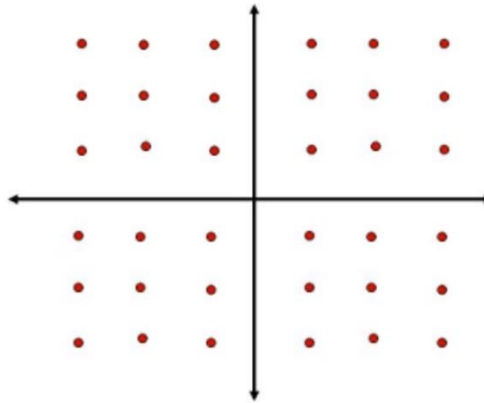
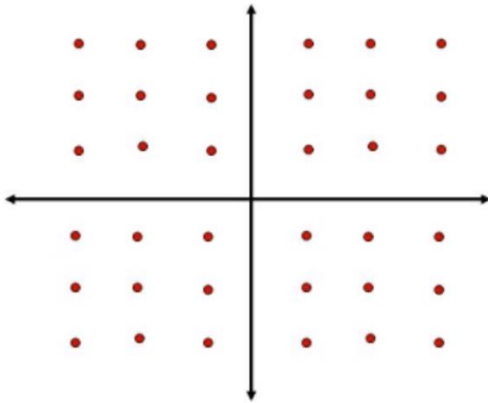
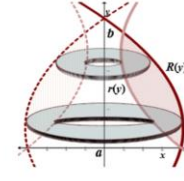
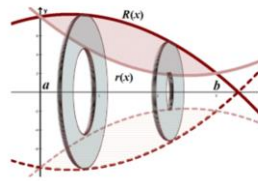
$$\text{Volume} = V = \pi \int_c^d [R(y)]^2 dy$$



THE WASHER METHOD

Use the washer method for solids of revolution with holes.

$$V = \pi \int_a^b ([R(x)]^2 - [r(x)]^2) dx$$



EXAMPLE 1

Use the fact that the world population was 2560 million in 1950 and 3040 million in 1960 to model the population of the world in the second half of the 20th century. (Assume that the growth rate is proportional to the population size.) What is the relative growth rate? Use the model to estimate the world population in 1993 and to predict the population in the year 2020.

EXAMPLE 2

The half-life of radium-226 is 1590 years.

a. A sample of radium-226 has a mass of 100 mg. Find a formula for the mass of the sample that remains after t years.

b. Find the mass after 1000 years correct to the nearest milligram.

c. When will the mass be reduced to 30 mg

EXAMPLE 3

At any time t , the rate of increase in the area of a bacteria is twice the area of the bacteria. If the initial area of the bacteria is 10, then what is the area at time t ?

EXAMPLE 4

The number of bacteria in a culture is growing at a rate of $3000e^{\frac{2t}{5}}$ per unit of time t . At $t = 0$, the number of bacteria present was 7,500. find the number present at $t = 5$.