

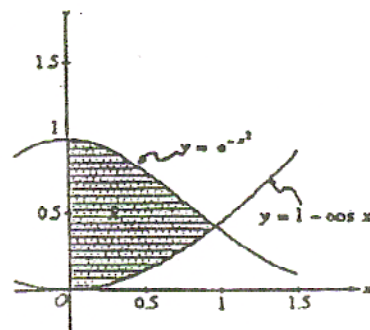
Work the following on notebook paper.

Problems 1 and 2 are **noncalculator**.

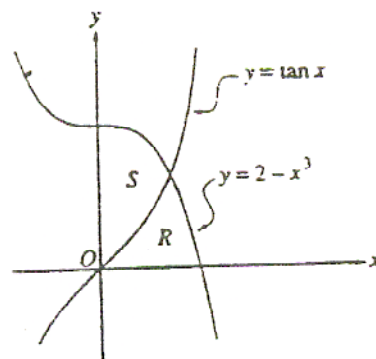
- Let  $R$  be the region bounded by the  $x$ -axis, the graph of  $y = \sqrt{x}$ , and the line  $x = 4$ .
  - Find the area of the region  $R$ .
  - Find the value of  $h$  such that the vertical line  $x = h$  divides the region  $R$  into two regions of equal area.
  - Find the volume of the solid generated when  $R$  is revolved about the  $x$ -axis.
  - The vertical line  $x = k$  divides the region  $R$  into two regions such that when these two regions are revolved about the  $x$ -axis, they generate solids with equal volumes. Find the value of  $k$ .
- Let  $R$  be the region enclosed by the graphs of  $y = e^x$ ,  $y = (x-1)^2$ , and the line  $x = 1$ .
  - Find the area of  $R$ .
  - Find the volume of the solid generated when  $R$  is revolved about the  $x$ -axis.
  - Set up, but do not integrate, an integral expression in terms of a single variable for the volume of the solid generated when  $R$  is revolved about the  $y$ -axis.

Use your calculator on problems 3 – 6.

- Let  $R$  be the shaded region in the first quadrant enclosed by the graphs of  $y = e^{-x^2}$ ,  $y = 1 - \cos x$ , and the  $y$ -axis, as shown in the figure.
  - Find the area of the region  $R$ .
  - Find the volume of the solid generated when the region  $R$  is revolved about the  $x$ -axis.
  - The region  $R$  is the base of a solid. For this solid, each cross section perpendicular to the  $x$ -axis is a square. Find the volume of this solid.

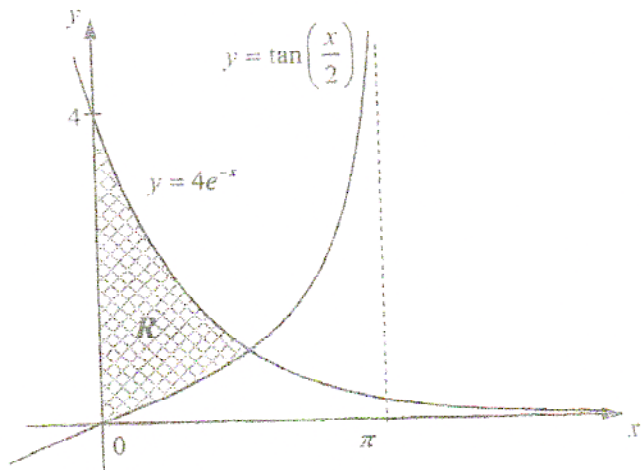


- Let  $R$  and  $S$  be the regions in the first quadrant shown in the figure. The region  $R$  is bounded by the  $x$ -axis and the graphs of  $y = 2 - x^3$  and  $y = \tan x$ . The region  $S$  is bounded by the  $y$ -axis and the graphs of  $y = 2 - x^3$  and  $y = \tan x$ .
  - Find the area of  $R$ .
  - Find the area of  $S$ .
  - Find the volume of the solid generated when  $S$  is revolved about the  $x$ -axis.



5. Let  $R$  be the shaded region in the first quadrant enclosed by the graphs of  $y = 4e^{-x}$ ,  $y = \tan\left(\frac{x}{2}\right)$ , and the  $y$ -axis, as shown in the figure.

- (a) Find the area of the region.  
 (b) Find the volume of the solid generated when the region  $R$  is revolved about the  $x$ -axis.  
 (c) The region  $R$  is the base of a solid. For this solid, each cross section perpendicular to the  $x$ -axis is a semicircle.  
 Find the volume of this solid.



6. Let  $R$  be the region bounded by the graphs of  $y = \sin(x^2)$  and  $y = 1 - x^2$ .
- (a) Find the area of  $R$ .  
 (b) Find the volume of the solid generated when  $R$  is revolved around the line  $y = -1$ .  
 (c) The region  $R$  is the base of a solid. For this solid, each cross section perpendicular to the  $x$ -axis is an isosceles right triangle with one leg in the region  $R$ . Find the volume of this solid.