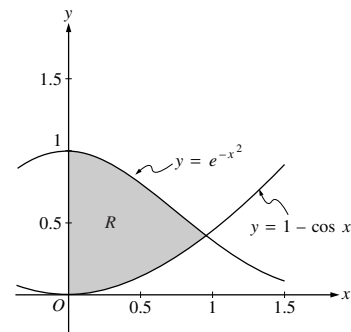


Let R be the shaded region in the first quadrant enclosed by the graphs of $y = e^{-x^2}$, $y = 1 - \cos x$, and the y -axis, as shown in the figure above.



- (a) Find the area of the region R .
- (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 square. Find the volume of this solid.

Region R

$$e^{-x^2} = 1 - \cos x \text{ at } x = 0.941944 = A$$

(a) Area = $\int_0^A (e^{-x^2} - (1 - \cos x)) dx$
 = 0.590 or 0.591

(b) Volume = $\pi \int_0^A ((e^{-x^2})^2 - (1 - \cos x)^2) dx$
 = $0.55596\pi = 1.746$ or 1.747

(c) Volume = $\int_0^A (e^{-x^2} - (1 - \cos x))^2 dx$
 = 0.461

1 : Correct limits in an integral in (a), (b), or (c).

2 { 1 : integrand
 1 : answer

3 { 2 : integrand and constant
 < - 1 > each error
 1 : answer

3 { 2 : integrand
 < - 1 > each error
 Note: 0/2 if not of the form
 $k \int_c^d (f(x) - g(x))^2 dx$
 1 : answer