

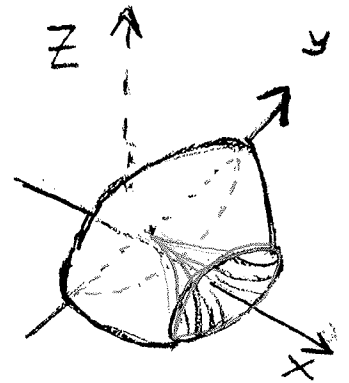
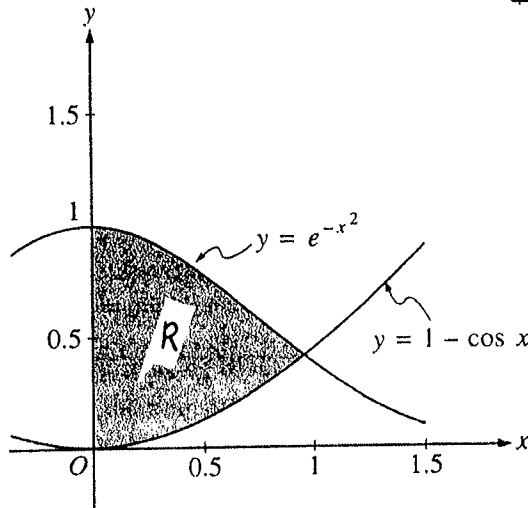
# WASHERS & SQUARES Sheet # 830.

NAME: \_\_\_\_\_

**KEY**

Period: \_\_\_\_\_

$AB2000 = \pi A = 1.$



1. 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.

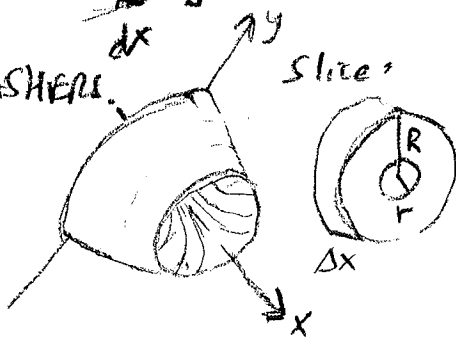
a) INTERSECTION of  $e^{-x^2} = 1 - \cos x$  is at  $(b, y(b))$ .  
 $b = 0.94194408$

SLICE:



$$A = \int_0^b [e^{-x^2} - (1 - \cos x)] dx = 0.590 \approx \boxed{0.591}$$

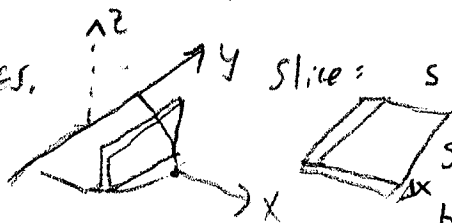
b) WASHERS



$$R(x) = e^{-x^2}, \quad r(x) = 1 - \cos x, \quad A(x) = \pi(R^2 - r^2)$$

$$V = \int_0^b A(x) dx = \int_0^b \pi [e^{-2x^2} - (1 - \cos x)^2] dx = 1.746 \approx \boxed{1.747}$$

c) SQUARES



$$A(x) = s^2 = [e^{-x^2} - (1 - \cos x)]^2$$

$$V = \int_0^b A(x) dx = \int_0^b [e^{-x^2} - (1 - \cos x)]^2 dx = \boxed{0.461}$$