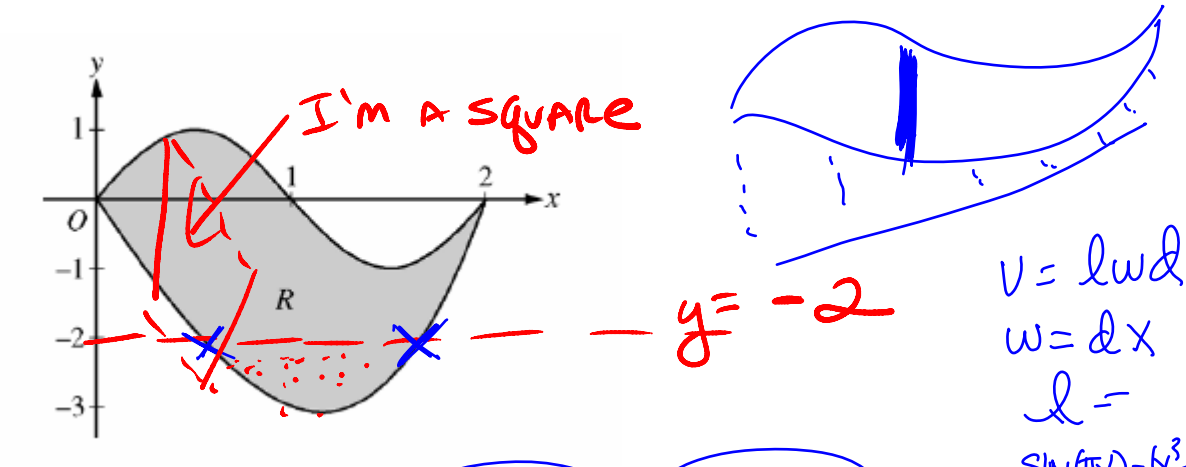
2008AB1 [calculator]



Let R be the region bounded by the graphs of $y = \sin(\pi x)$ and $y = x^3 - 4x$ as shown in the figure above.

(a) Find the area of R

$$\int_0^2 [\sin(\pi x) - (x^3 - 4x)]\,dx \approx 4$$

(b) The horizontal line $y = -2$ splits the region into two parts. Write, but do NOT evaluate, an integral expression for the area of the part of R that is below this horizontal line.

$$\int_{.5391889}^{1.6751309} [-2 - (x^3 - 4x)]\,dx$$

(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.

$$V = \int_0^2 [\sin(\pi x) - (x^3 - 4x)]^2\,dx$$

$A(x) = s^2$

≈ 9.978 CUBIC UNITS

(d) The region R models the surface of a small pond. At all points in R at a distance x from the $y-$axis, the depth of the water is given by $h(x)=3-x$. Find the volume of water in the pond.

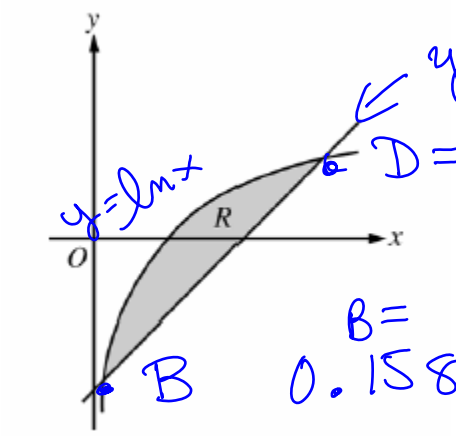
DEPTH $(3-x)$ · DISTANCE ACROSS POND $[\sin(\pi x)-(x^3-4x)]$ · WIDTH dx

$$V=\int_0^2 (3-x)\left[\sin(\pi x)-(x^3-4x)\right]dx$$

$$\approx 8.376 \text{ or } 8.369$$

CUBIC UNITS

2006 AB 1 [calculator]



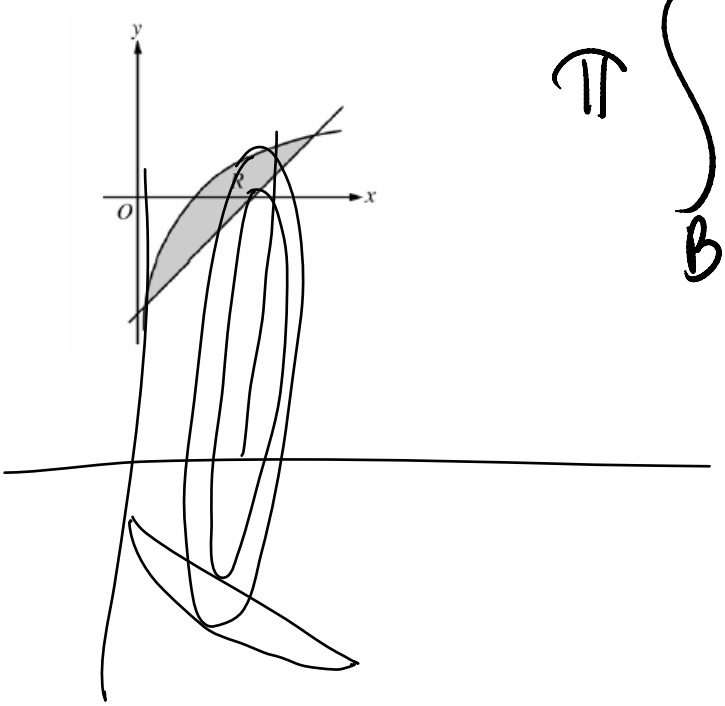
Let R be the shaded region bounded by the graph of $y=\ln x$ and the line $=x-2$ as shown above.

(a) Find the area of R

$$\text{Area}_R=\int_B^D \left[\ln x-(x-2)\right]dx$$

$$\approx 1.949$$

(b) Find the volume of the solid generated when R is rotated about the horizontal line $y = -3$



$$\pi \int_B^D \left[(3+\ln x)^2 - (x+1)^2\right] dx$$

$$\approx 10.886\pi$$

or 34.198 or 34.199

$R(x) = 3 + \ln x$

$r(x) = x - 2 + 3$

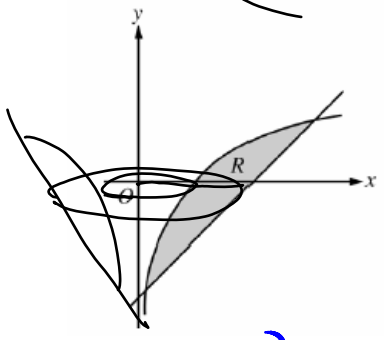
(c) Write, but do not evaluate, an integral expression that can be used to find the volume of the solid generated when R is rotated about the $y-$axis.

$y = \ln x$

$e^y = x$

$y = x - 2$

$y + 2 = x$



$R(y) = y + 2$

$r(y) = e^y$

$$V = \pi \int_{B-2}^{D-2} \left[(y+2)^2 - (e^y)^2\right] dy$$