Calculus

Chapter 6: Applications of Integrals

Lesson 2: Volume by Discs (Slicing)

Question #1

Reference Q.607

Find the volume when the area bounded by the line $y = 2x$ and the curve $y = 6x - x^2$ are rotated about the x axis.

Question #2

Reference Q.608

Find the volume when the area bounded by the lines $y = 2 - 3x$, $x = 0$, and $y = 0$ are rotated about the x--axis.

Question #3

Reference Q.609

Find the volume of revolution when the area bounded by the curve $y = 2 - 3x$, $x = 0$, and $y = 0$ is rotated about the y-axis.

Question #4

Reference Q.610

Find the volume of a sphere with a radius of 3 units using the volume by discs method.

Question #5

Reference Q.611

(Try this!): Find the volume of a solid built on a base which is bounded by the curves $y = \sqrt{x - 1}$ and the x axis from 1 to 5, if the cross sections perpendicular to the x axis are squares.

Question #6

Reference Q.612

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the x axis.

$y = x^{1/3} + 1,\ y = 1$ from $x = 0$ to $x = 8$

Question #7

Reference Q.613

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the x axis.

$y = 4 - x^2, \quad y = 0$

Question #8

Reference Q.614

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the x axis.

$y = \sqrt{\sin x},\ \ x = 2y$

Question #9

Reference Q.615

For the following question, use technology to find the approximate Volume of the solid that results when the indicated areas are rotated about the y axis.

$x = \tan y, x = 0, y = 1$

Question #10

Reference Q.616

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the line $y = -1$.

$y = 2\cos x,\ y = -1,\ x = -1,\ x = 1$

Question #11

Reference Q.617

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the x axis.

$y = \frac{1}{\sqrt{x^2+9}}, y = 0,\ \ x = 0\ to\ 3$

Question #12

Reference Q.619

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the y-axis.

$x = \sec y,\ x = 0,\ y\ from - \frac{\pi}{4}\ to \frac{\pi}{4}$

Question #13

Reference Q.620

For the following question, find the Volume of the solid that results when the indicated areas are rotated about the y-axis.

$x = y^3,\ \ y = x$

Question #14

Reference Q.621

For the following question, find the Volume of the solid that results when the indicated area is rotated about the y-axis.

$y = e^{3x},\ x = 0,\ x = 1,\ y = 0$

Question #15

Reference Q.622

Find the volume when a solid bounded by the curves $y = 3\sqrt{x-1}$, $y = 0$, and $x = 4$ is revolved around the line $y = -6$.

Question #16

Reference Q.623

Find the volume when a solid bounded by the curves $y = 3\sqrt{x-1}$ and $y = 0$ and $x = 5$ are revolved around the line $x = -4$.

Question #17

Reference Q.624

Find the volume of a solid created by rotating the area bounded by $x = 2y - y^2$, and $x = y$ are revolved around the y-axis.

Question #18

Reference Q.625

The region bounded between the curves $x = 2y^2$ and $y = 2x$ is rotated about the line $x = 2$. Using the disc/washer method (i.e. not cylindrical shells), determine the integral used to calculate the volume of the resulting solid. (Note: Set up the integral, but you do not have to evaluate.)

Question #19

Reference Q.626

(Try this!) Find the volume of the sphere created by rotating the top half of the circle defined by the equation $x^2 + y^2 = 9$ over the x-axis.

Question #20

Reference Q.9246

What is the volume of the solid generated by rotating the area enclosed by $f(x) = x^3$, $g(x) = 2^{1-x}$, the x-axis, and $x = 4$, around the x-axis.

Question #21

Reference Q.9247

Find the volume of the solid generated by rotating the region bounded by the x-axis, y-axis, $x = 2$, $f(x) = e^{x-1}$, and $g(x) = e^{1-x}$ around the x-axis.

Question #22

Reference Q.9248

Find the volume of a damaged cardboard box with a base we can model as the region under the parabola $f(x) = \frac{(x-1)^2}{4} + 1$ bounded by the y-axis, the x-axis, and $x = 2$, and cross sections perpendicular to the x-axis which are squares.

Question #23

Reference Q.9249

Find the volume of the solid generated by rotating the ellipse $4x^2 + y^2 = 9$ about the y-axis.

Question #24

Reference Q.9604

The base of a solid is the region enclosed by the parabola $y = 3x^2$, the line $x = 2$, and the x-axis. If the cross sections perpendicular to the x-axis are squares, find its volume.

Question #25

Reference Q.9605

The base of a solid is the region in the first quadrant enclosed by the graph $y = 2e^{-x}$, and the line $x = 1$. If the cross sections perpendicular to the x-axis are semi-circles, find its volume.

Question #26

Reference Q.9606

The base of a solid is the region enclosed by the graph of $y = \sqrt{sinx}$, the line $y = 1$, and the y-axis. If the cross sections perpendicular to the y-axis are equilateral triangles, find its volume.

Question #27

Reference Q.9607

The base of a solid is the region in the first quadrant bounded by the x-axis, y-axis and the line $x + 4y = 8$.If the cross sections perpendicular to the y-axis are rectangles whose width is half their length (where the length is in the x direction), find its volume.

Question #28

Reference Q.50209

The region in the first quadrant bounded by the graph of $y = 4 - 2x$ and the x and y axes forms the base of a solid. If the cross-sections are equilateral triangles and are perpendicular to the x axis, what is the volume of the solid?

Question #29

Reference Q.50206

The region in the first quadrant bounded by the graphs of $y = \sin 2x$ and the x axis for $0 \leq x \leq \frac{\pi}{2}$ forms the base of a solid. If each cross-section of the solid is perpendicular to the y-axis and is a rectangle whose height is double the width, what is the volume of the solid?