Calculus

Chapter 6: Applications of Integrals

Lesson 3: Volume by Shells

Question #1

Reference Q.627

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis: (You need to evaluate the integral using a calculator!!)

$y = e^{2x}$ from 1 to 4 is revolved about the y axis.

Question #2

Reference Q.628

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis: (Make sure you use a calculator to evaluate an integral)

$x = \sin y$ from $y = 0$ to π about the x axis.

Question #3

Reference Q.629

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y = 5x^3, \quad x = 2, \quad y = 0$, around the y-axis

Question #4

Reference Q.630

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis: Make sure to use a calculate to evaluate an integral!

$y = e^{3-x}, \quad y = 0, \quad x = 1, \quad x = 2$, around the y-axis

Question #5

Reference Q.631

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y = -x + 3, x = 0, y = 0,$ around the y-axis.

Question #6

Reference Q.632

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y = -x + 3, \ x = 0, \ y = 0$ around the x-axis.

Question #7

Reference Q.633

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y = e^{x^2}, \ x = 0, \ x = \sqrt{2}, \ y = 0$, around the y-axis

Question #8

Reference Q.634

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y^2 = x, \ y = 2 - x$, around the line $y = -2$

Question #9

Reference Q.635

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y^2 = x, \ y = 2 - x, \ x = 0$, around the line x = 6.

Question #10

Reference Q.636

Use the method of cylindrical shells to calculate the volume that's created when the following area is revolved around the indicated axis:

$y = \frac{2}{x^2}, \quad x = 1, \quad x = 4, \quad y = 0$ about the line $x = 1$.

Question #11

Reference Q.637

Use the method of cylindrical shells to calculate the volume that's created when the area bounded by the following two curves is revolved around the indicated axis:

$y = 2x^2, x = 2y^2$, about the y-axis.

Question #12

Reference Q.638

Use cylindrical shells to find the volume of a cylinder of height h and radius r. (Hint: pick a shape and an appropriate rotation to generate a cylinder)

Question #13

Reference Q.9250

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

Question #14

Reference Q.9251

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

Question #15

Reference Q.9252

Find the volume of a cushion which normally has a volume of $\frac{3\pi}{2}$ volume units and a radius of 1, but has been sat on for an extended period of time, and is sunken in in the middle (the edges are fine). We can describe the cushion as the solid generated by rotating a parabola $f(x) = \frac{x^2}{2} + c$ bounded by the x-axis and $x = \pm a$ around the y-axis.

Question #16

Reference Q.9253

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