W01 - Homework

Stepwise problems - Thu. 11:59pm

Shells

01

Shells volume - offset graph, y-axis

Consider the region in the first quadrant bounded by the lines $x = 0$, $x = 2$, $y = 0$, and the curve $y = \frac{1}{\sqrt{x^2+1}}$. Revolve this about the y-axis.

Find the volume of the resulting solid.

IBP

02

Integration by parts - A and E

Compute the integral:

$$\int (2x + 9)e^x \, dx$$

03

Integration by parts - A and T

Compute the integral:

$$\int x^2 \sin x \, dx$$

Regular problems - Sat. 11:59pm

Shells

04

Shells volume - set up integrals, both axes

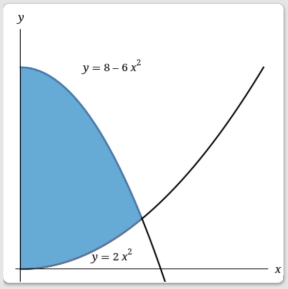
Consider the region in the first quadrant bounded by the lines $x = 0$ and $x = 2$, and the curve $y = 4 - x^2$.

Set up integrals to find the volumes of the solids obtained by revolving this region about (i) the x-axis, and (ii) the y-axis. (No need to evaluate these integrals.)

05

Shells volume - shells v. washers

Consider the region in the xy-plane, in the first quadrant, bounded by the y-axis on the left, by $y = 8 - 6x^2$ on the top, and $y = 2x^2$ on the bottom.



A 3D solid is given by revolving this region around the y-axis.

- (a) Find the volume of the solid using the method of shells.
- (b) *Attempt* to find the volume of the solid using the method of washers/disks. Why is this harder? (TWO reasons!)

IBP

06

Integration by parts - A and L

Compute the integral:

$$\int x^3 \ln x \, dx$$

07

Integration by parts - A and E

Compute the integral:

$$\int_0^3 xe^{4x} \, dx$$

08

Integration by parts - A and I

Compute the integral:

$$\int \tan^{-1}(x) \, dx$$

09

Integration by parts - E and T, 'breaking the circle'

Compute the integral:

$$\int e^x \sin(x) \, dx$$

You should perform IBP twice, find an equation, and use algebra to solve it ('breaking the circle') for the desired integral.