VOLUMES OF SOLIDS
BY SLICING

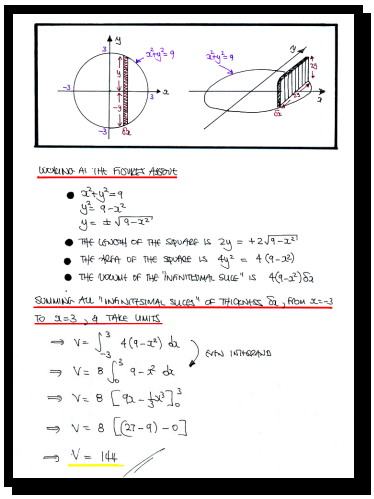
Question 1

A solid's base is bounded by the circle with equation

$$x^2 + y^2 = 9 .$$

Determine the volume of the solid, given that every vertical cross-section of the solid, which is perpendicular to the x axis, is a square.

$\square$, $\boxed{144}$



Question 2

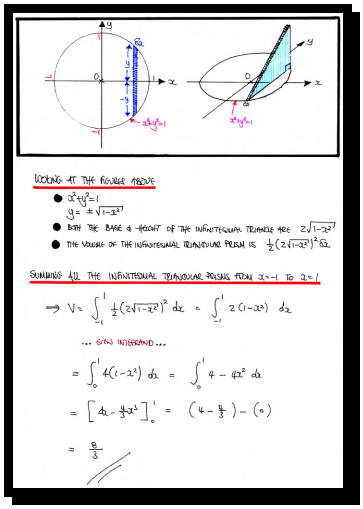
A solid's base is bounded by the circle with equation

$$x^2 + y^2 = 1 .$$

Every vertical cross-section of the solid, perpendicular to the x axis, is a right angled isosceles triangle, with one of its non hypotenuse sides on the base of the solid.

Determine the volume of the solid.

$\square$, $\boxed{\frac{8}{3}}$



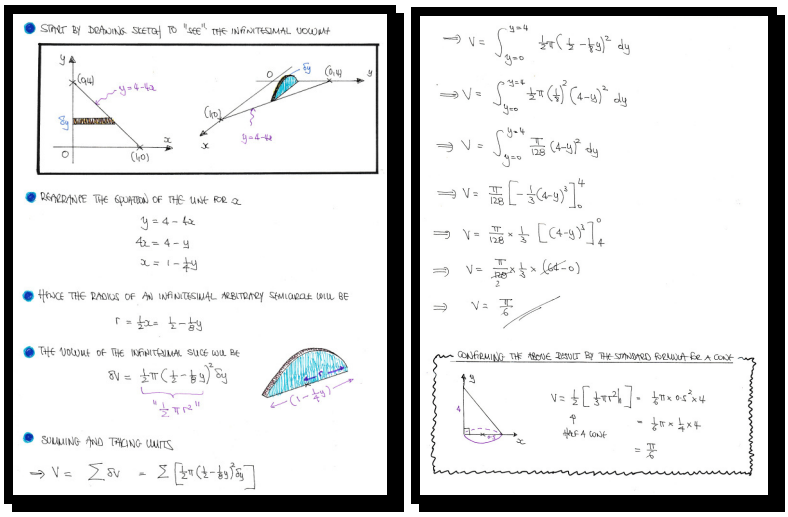
Question 3

A solid's base is bounded by the right angled triangle in the x-y plane whose vertices have coordinates $(0,0)$, $(1,0)$ and $(0,4)$.

Every vertical cross-section of the solid, perpendicular to the y axis, is a semicircle with its diameter lying on the base of the solid.

Use calculus to determine the volume of the above described solid.

$\square$, $\boxed{\frac{\pi}{6}}$



Question 4

The finite region R is bounded by the curve with equation

$$y = x^2 - 1,$$

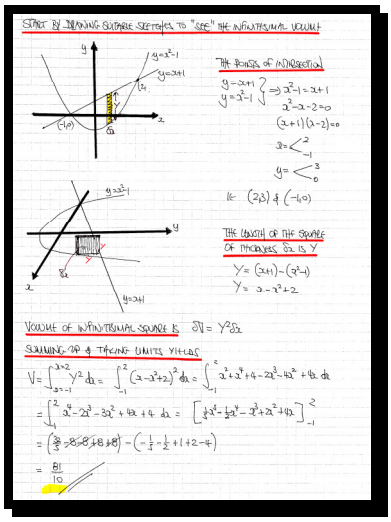
and the straight line with equation

$$y = x + 1$$

A solid's base is bounded by R and every vertical cross-section of the solid, perpendicular to the x axis, is a square with one of sides on the base of the solid.

Determine the volume of the solid.

$\square$, $\frac{81}{10}$



Question 5

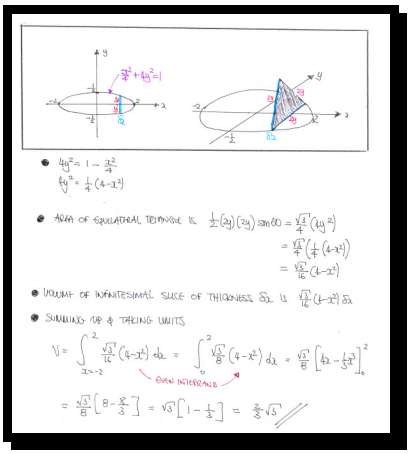
A solid's base is bounded by the ellipse with equation

$$\frac{1}{4}x^2+4y^2=1.$$

Every vertical cross-section of the solid, perpendicular to the x axis, is an equilateral triangle, with one of its sides on the base of the solid.

Determine the volume of the solid.

$$\boxed{\frac{2}{3}\sqrt{3}}$$



Question 6

An ellipse E has equation

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}=1,$$

where a and b are positive constants.

Use integral calculus to show that the volume of a right elliptical cone with base E and height h, is given by

$$\frac{1}{3}\pi abh\,.$$

You may assume the standard result for the area of an ellipse without proof.

[ ], [proof]

