

Quiz 7

Name: Key Row: _____

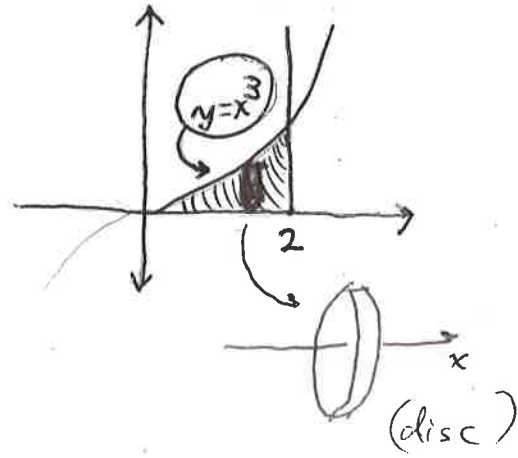
1. Find the volume obtained by revolving the shaded region around the x -axis.
 (For one point extra credit, illustrate the method you used by drawing a thin rectangle within the region and drawing what you get when this rectangle is revolved around the x -axis.)

[10]

$$V = \int_0^2 \pi y^2 dx$$

$$= \int_0^2 \pi (x^3)^2 dx$$

$$= \int_0^2 \pi x^6 dx = \left[\frac{\pi x^7}{7} \right]_0^2 = \frac{128\pi}{7}$$



2. The region in the diagram lies between the graphs of $y = 10 - 3x$, $y = x^2$, and $x = 0$. Find the volume of the solid obtained by revolving the region around the y -axis.

(For one point extra credit, illustrate the method you used by drawing a thin rectangle within the region and drawing what you get when this rectangle is revolved around the y -axis.)

$$V = \int_0^2 2\pi (\text{height}) (\text{radius}) (\text{thickness}) dx$$

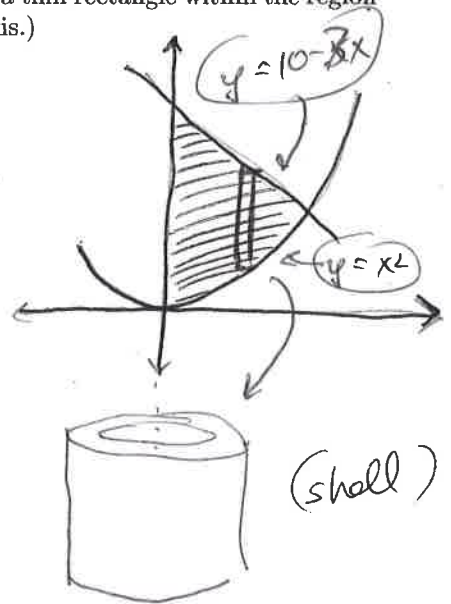
$$= \int_0^2 2\pi (10 - 3x - x^2) \cdot x dx$$

$$= 2\pi \int_0^2 (10x - 3x^2 - x^3) dx$$

$$= 2\pi \left[5x^2 - x^3 - \frac{x^4}{4} \right]_0^2$$

$$= 2\pi \left[20 - 8 - \frac{16}{4} \right]$$

$$= 2\pi [8] = 16\pi$$



Point of intersection:

$$10 - 3x = x^2$$

$$x^2 + 3x - 10 = 0$$

$$(x + 5)(x - 2) = 0$$

$$x = -5 \text{ or } x = 2$$

The point of intersection is to the right of the y -axis, so $x = 2$.

(1)

Alternatively, By shells:
 $V = \int_0^8 2\pi y(2 - y^{1/3}) dy$

Alternatively,

By discs:

$$V = \int_0^4 \pi (\sqrt{y})^2 dy + \int_4^{10} \pi \left(\frac{y-10}{-3} \right)^2 dy$$