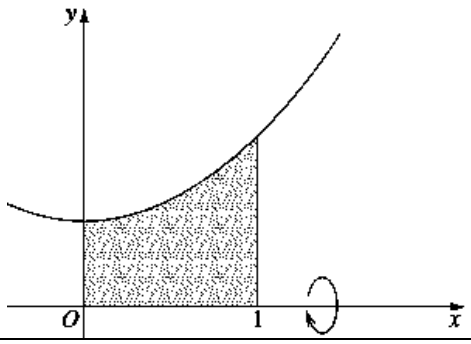
07	**9a**	In the shaded region in the diagram is bounded by the curve $y = x^2 + 1$, the x-axis, and the lines $x = 0$ and $x = 1$. Find the volume of the solid of revolution formed when the shaded region is rotated about the x-axis. 	**3**

$$y = x^2 + 1$$
$$y^2 = (x^2 + 1)^2$$
$$= x^4 + 2x^2 + 1$$

Volume $= \pi \int y^2 \, dx$

$$= \pi \int_0^1 x^4 + 2x^2 + 1 \, dx$$
$$= \pi \left[\frac{x^5}{5} + \frac{2x^3}{3} + x \right]_0^1$$
$$= \pi \left[\frac{1}{5} + \frac{2}{3} + 1 - 0 \right]$$
$$= \frac{28\pi}{15}$$

$\therefore$ volume of $\frac{28\pi}{15}$ unit^3

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

Board of Studies: Notes from the Marking Centre

Most candidates knew the formula $V = \pi \int_a^b y^2 dx$. The expansion of $(x^2 + 1)^2$ was not well done. The most common error was $x^4 + 1$. Though the question clearly stated rotation about the x-axis, quite a few candidates rotated about the y-axis.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/