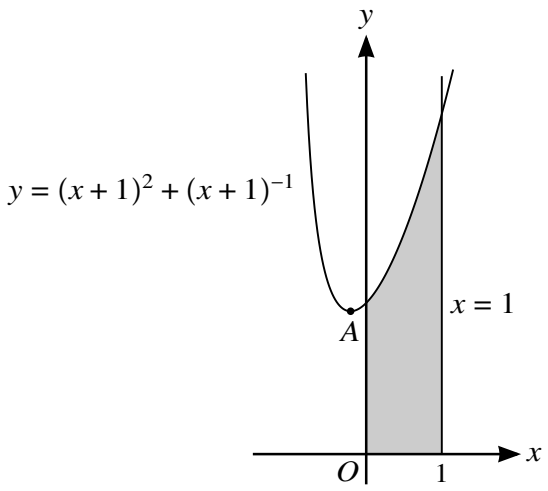
11



The diagram shows part of the curve $y = (x + 1)^2 + (x + 1)^{-1}$ and the line $x = 1$. The point A is the minimum point on the curve.

(i) Show that the x-coordinate of A satisfies the equation $2(x + 1)^3 = 1$ and find the exact value of $\frac{d^2y}{dx^2}$ at A. [5]

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(ii) Find, showing all necessary working, the volume obtained when the shaded region is rotated through 360° about the x-axis. [6]