6. (a) Given that $x^4 + y^4 = 1$, prove that $x^2 + y^2$ is a maximum when $x = \pm y$, and find the maximum and minimum values of $x^2 + y^2$.

(7)

(b) On the same diagram, sketch the curves C_1 and C_2 with equations $x^4 + y^4 = 1$ and $x^2 + y^2 = 1$ respectively.

(2)

(c) Write down the equation of the circle C_3, centre the origin, which touches the curve C_1 at the points where $x = \pm y$.

(1)