

**10 (a)** You are given that  $(x^2 + y^2)^3 = x^6 + 3x^4y^2 + 3x^2y^4 + y^6$ .

Hence, or otherwise, prove that  $\sin^6 \theta + \cos^6 \theta = 1 - \frac{3}{4} \sin^2 2\theta$  for all values of  $\theta$ . **[4]**

**(b)** Use the result from part **(a)** to determine the minimum value of  $\sin^6 \theta + \cos^6 \theta$ . **[2]**