Question 18 **(7 marks)**

(a) Show that for all positive integers n and complex numbers z where $0 \leq \theta \leq \frac{\pi}{2}$,

$(z^n - cis\,(\theta))(z^n + cis\,(-\theta)) = z^{2n} - (2i \sin\theta)\, z^n - 1$. (3 marks)

(b) Hence, using the result from part (a), obtain all the solutions to the equation $z^6 - (i)z^3 - 1 = 0$ in exact polar form. (4 marks)