4. A complex number z has modulus 1 and argument θ.

(a) Show that

$$z^n + \frac{1}{z^n} = 2\cos n\theta, \qquad n \in \mathbb{Z}^+$$

(2)

(b) Hence, show that

$$\cos^4 \theta = \frac{1}{8}(\cos 4\theta + 4\cos 2\theta + 3)$$

(5)