11 In this question you must show detailed reasoning.

(a) Show that $\tan\theta + \cot\theta \equiv 2\operatorname{cosec} 2\theta$. **[4]**

(b) Hence solve the equation $\tan\theta + \cot\theta = 4$, for $0° < \theta < 360°$. **[4]**

(c) Given that $\sin 2\theta(\tan\frac{1}{2}\theta + \cot\frac{1}{2}\theta) = 3$, determine the exact value of $\cos\theta$. **[3]**