11 (a) Express the equation

$$3\sin(A-B) = \sin(A+B)$$

in the form $\tan A = k \tan B$, giving the value of the integer k.

(4)

(b) Given that $\theta \neq \frac{(2n+1)\pi}{2}$ where $n \in \mathbb{Z}$,

show that
$$\frac{\cos^4 \theta - \sin^4 \theta}{\cos^2 \theta} = 1 - \tan^2 \theta$$

(3)

(c) Using the exact values of $\sin x^{\circ}$, $\cos x^{\circ}$ and $\tan x^{\circ}$ for x = 30, 45, 60 show that

(i)
$$\cos 15^\circ = \frac{\sqrt{6} + \sqrt{2}}{4}$$

(2)

(ii)
$$\tan 255^\circ = \frac{3 + \sqrt{3}}{3 - \sqrt{3}}$$

(4)

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