4 $$\tan(A + B) = \frac{\tan A + \tan B}{1 - \tan A \tan B}$$

(a) (i) Write down an expression for $\tan(2x)$ in terms of $\tan x$

(ii) Hence show that $\tan(3x) = \dfrac{3\tan x - \tan^3 x}{1 - 3\tan^2 x}$

(6)

Given that α is the acute angle such that $\cos\alpha = \dfrac{1}{3}$

(b) find the exact value of $\tan\alpha$

(2)

(c) Hence use the identity in part (a) to find the exact value of $\tan(3\alpha)$

Give your answer in the form $\dfrac{a\sqrt{2}}{b}$ where a and b are integers.

(2)

Question 4 continued

Question 4 continued

Question 4 continued

(Total for Question 4 is 10 marks)