8

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

$$\sin(A + B) = \sin A \cos B + \cos A \sin B$$

Using the above identities

(a) show that (i) $\cos 2\theta = 1 - 2\sin^2\theta$

(ii) $\sin 2\theta = 2\sin\theta\cos\theta$

(3)

$$f(\theta) = \cos 4\theta + 2\cos 2\theta$$

(b) Show that $f(\theta) = 8\sin^4\theta - 12\sin^2\theta + 3$

(4)

(c) Solve, giving your solutions to 3 significant figures, the equation

$$4\sin^4 x° - 6\sin^2 x° - \cos 2x° + 1.2 = 0 \qquad 0 \leqslant x < 90$$

(4)

(d) (i) Find $\int (2\sin^4\theta - 3\sin^2\theta)\,d\theta$

(ii) Hence find the exact value of $\int_0^{\frac{\pi}{3}} (2\sin^4\theta - 3\sin^2\theta)\,d\theta$

Give your answer in the form $a\sqrt{b} - c\pi$ where a and c are rational numbers and b is a prime number.

(5)

Question 8 continued

Question 8 continued

Question 8 continued

(Total for Question 8 is 16 marks)