10 $\cos(A + B) = \cos A \cos B - \sin A \sin B$

(a) Show that $\cos^2\theta = \frac{1}{2}(\cos 2\theta + 1)$

(3)

Given that $f(\theta) = 8\cos^4\theta + 8\sin^2\theta - 7$

(b) show that $f(\theta) = \cos 4\theta$

(5)

(c) Solve, for $0 \leqslant \theta \leqslant \frac{\pi}{2}$, the equation

$$16\cos^4\left(\theta - \frac{\pi}{6}\right) + 16\sin^2\left(\theta - \frac{\pi}{6}\right) - 15 = 0$$

(4)

(d) Using calculus, find the exact value of

$$\int_0^{\frac{\pi}{2}} (8\cos^4\theta + 8\sin^2\theta + 2\sin 2\theta)\, d\theta$$

(4)

Question 10 continued

Question 10 continued

Question 10 continued

Question 10 continued

(Total for Question 10 is 16 marks)

TOTAL FOR PAPER IS 100 MARKS