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

(a) (i) Using the above identity, show that

$$\cos 2x = 1 - 2\sin^2 x$$

(ii) Hence show that

$$\frac{13\sin x - 2\cos 2x - 10}{4\sin x - 3} = 4 + \sin x$$

**(7)**

(b) Hence solve, in radians to 3 significant figures, the equation

$$10 + 2\cos\left(2\theta + \frac{\pi}{3}\right) - 13\sin\left(\theta + \frac{\pi}{6}\right) = 2\sin\left(\theta + \frac{\pi}{6}\right) + 8$$

for $\pi \leqslant \theta \leqslant 2\pi$

**(5)**

(c) Find the exact value of

$$\int_0^{\frac{\pi}{2}} \left( \frac{13\sin x - 2\cos 2x - 10 + 4x\sin x - 3x}{4\sin x - 3} \right) \mathrm{d}x$$

**(5)**

**Question 11 continued**

**Question 11 continued**

**Question 11 continued**

**Question 11 continued**



**(Total for Question 11 is 17 marks)**

**TOTAL FOR PAPER IS 100 MARKS**