11 $\mathrm{f}(\theta) = (2\cos\theta - \sin\theta)(2\sin\theta + \cos\theta)$

(a) Show that $\mathrm{f}(\theta) = \frac{3}{2}\sin 2\theta + 2\cos 2\theta$

(3)

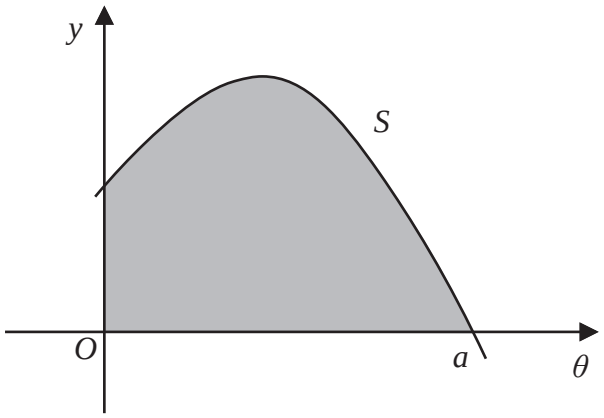

Diagram **NOT** accurately drawn

Figure 4

Figure 4 shows part of the curve S with equation $y = \mathrm{f}(\theta) + 2$

Given that S intersects with the θ-axis at the point with coordinates $(a, 0)$

(b) using $\sin^2\theta + \cos^2\theta = 1$, or otherwise, show that $a = \frac{\pi}{2}$

(5)

(c) Using algebraic integration, find the exact area bounded by S, the positive θ-axis and the positive y-axis shown shaded in Figure 4

(3)

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 11 continued

Question 11 continued

(Total for Question 11 is 11 marks)

TOTAL FOR PAPER IS 100 MARKS