5 The roots of the quadratic equation $2x^2 + (6 + 2p)x + 2p = 0$ are α and β

(a) Write down an expression in terms of p for

(i) $\alpha + \beta$ (ii) $\alpha\beta$

(2)

(b) Show that $(\alpha - \beta)^2 = 9 + 2p + p^2$

(4)

Given that $(\alpha - \beta) = 3$

(c) find the possible values of p

(3)

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Question 5 continued

Question 5 continued

Question 5 continued

(Total for Question 5 is 9 marks)

6 (a) Using a formula from page 2, show that $\cos 2A = 1 - 2\sin^2 A$

(2)

The finite region R is bounded by the curve with equation $y = 3 + 2\sin x$, the x-axis, the y-axis and the line with equation $x = \dfrac{\pi}{4}$

The region R is rotated through 360° about the x-axis.

(b) Use calculus to find the volume of the solid generated.
Give your answer to the nearest integer.

(6)

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Question 6 continued

(Total for Question 6 is 8 marks)

7 (i) (a) Using a formula from page 2, show that

$$\tan 2\theta = \frac{2\tan\theta}{1-\tan^2\theta}$$

(2)

Given that $\tan 2\alpha = 1$

(b) show that $\tan\alpha = a \pm \sqrt{b}$ where a and b are integers whose values need to be found.

(3)

(ii) (a) Using formulae from page 2, show that $\cos(x-30)^\circ = \sin(x+30)^\circ$ can be written as $\tan x^\circ = 1$

(4)

(b) Hence, or otherwise, solve

$$\cos(2y-30)^\circ = \sin(2y+30)^\circ \qquad \text{for } -90 < y \leqslant 90$$

(2)

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Question 7 continued

Question 7 continued

Question 7 continued

(Total for Question 7 is 11 marks)