Question	Scheme	Marks	AOs
4(i) (a)	It is possible as the number of columns of matrix **A** matches the number of rows of matrix **B**.	B1	2.4
(b)	It is not possible as matrix **A** and matrix **B** have different dimensions o.e. different number of columns	B1	2.4
		(2)	
(ii) (a)	$\lambda = 5$	B1	2.2a
	$a = 1,\ b = 2$	B1	2.2a
(b)	Inverse matrix $= \frac{1}{5}\begin{pmatrix} 0 & 5 & 0 \\ 2 & 12 & -1 \\ -1 & -11 & 3 \end{pmatrix}$	B1 ft	3.1a
		(3)	
(iii)	A complete method to find the determinant of the matrix and set equal to zero.	M1	1.1b
	Determinant $= 1(\sin\theta\sin 2\theta - \cos\theta\cos 2\theta) - 1(0) + 1(0) = 0$	A1	1.1b
	Uses compound angle formula to achieve $\cos 3\theta = 0$ leading to $\theta = ...$ or use of $\sin 2q = 2\sin q\cos q$ and $\cos 2q = 1 - 2\sin^2 q$ (e.g. to achieve $\cos q(4\sin^2 q - 1) = 0$) leading to $\theta = ...$ or use of $\sin 2q = 2\sin q\cos q$ and $\cos 2q = 2\cos^2 q - 1$ (e.g. to achieve $4\cos^3 q - 3\cos q = 0$) leading to $\theta = ...$	M1	3.1a
	$\theta = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$	A1	1.1b
		(4)	
			(9 marks)

Notes:

(i)(a)

B1: Comments that the number of columns of matrix **A** (2) equals the number of rows of matrix **B** (2) therefore it is possible. Accept other terminology that is clear in intent e.g. "length of **A**" and "height of **B**"

(b)

B1: Comments that matrix **A** and matrix **B** have different dimensions therefore it is not possible.

(ii)(a)

B1: Deduces the correct value for $\lambda = 5$

B1: Deduces the correct values for *a* and *b*

(b)

B1ft: Identifies and applies a correct method find the inverse matrix. May multiply from the given equation, in which case follow through on their value of lambda. Alternatively, award for a correct matrix found by calculator or long hand having found *a* and *b* and using these values in the matrix.

(iii)

M1: A complete method to find the determinant of the matrix and sets it equal to 0

A1: Correct equation

M1: Uses appropriate correct trig identities to solve the equation and finds a value for q

A1: All three correct values $\theta = \frac{\pi}{6}, \frac{\pi}{2}, \frac{5\pi}{6}$ and no others in the range.