January 2020
WFM01/01 Further Pure Mathematics F1
Mark Scheme

Question Number	Scheme	Notes	Marks
1.	(a) $\mathbf{A}=\begin{pmatrix} p & -5 \\ -2 & p+3 \end{pmatrix}$ (b) $p=3$; $\mathbf{A}=\begin{pmatrix} a & -5 \\ -2 & d \end{pmatrix}$		
(a)	$\det(\mathbf{A}) = p(p+3)-(-5)(-2)$ $\{= p(p+3)-10\}$	Applies $p(p+3)\pm(-5)(-2)$	M1
	$p^2+3p-10=0 \Rightarrow (p+5)(p-2)=0 \Rightarrow p=...$	Obtains a correct expression for $\det(\mathbf{A})$, sets their $\det(\mathbf{A})=0$ and solves their 3TQ = 0 by any valid method to give $p=....$	M1
	$p=-5, 2$	$p=-5, 2$	A1
			(3)
(b)	$\left\{ p=3 \Rightarrow \mathbf{A}=\begin{pmatrix} 3 & -5 \\ -2 & 6 \end{pmatrix} \right\}$		
	For either $\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$ or $\det(\mathbf{A}) = 3(3+3)-10$ or 8	For **either** $\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$ **or** a correct numerical expression or value for $\det(\mathbf{A})$, which can be seen or implied	B1
	$\mathbf{A}^{-1}=\frac{1}{3(3+3)-(-5)(-2)}\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$	$\frac{1}{ad\pm(-5)(-2)}\text{Adj}(\mathbf{A})$, where a correct method has been employed for finding their $\text{Adj}(\mathbf{A})$	M1
	$\mathbf{A}^{-1}=\frac{1}{8}\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$ or $=\begin{pmatrix} \frac{3}{4} & \frac{5}{8} \\ \frac{1}{4} & \frac{3}{8} \end{pmatrix}$ or $=\begin{pmatrix} 0.75 & 0.625 \\ 0.25 & 0.375 \end{pmatrix}$ or $=\begin{pmatrix} \frac{6}{8} & \frac{5}{8} \\ \frac{2}{8} & \frac{3}{8} \end{pmatrix}$	Correct $\mathbf{A}^{-1}$	A1
			(3)
			6

Question 1 Notes

1. (b)	**Note**	$\mathbf{A}=\begin{pmatrix} a & b \\ c & d \end{pmatrix} \Rightarrow \text{Adj}(\mathbf{A})=\begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$ is a correct method for finding their $\text{Adj}(\mathbf{A})$
	Note	Allow B1 M1 A0 for just writing $\frac{1}{3(3+3)-(-5)(-2)}\begin{pmatrix} p+3 & 5 \\ 2 & p \end{pmatrix}$
	Note	Allow B0 M1 A0 for just writing $\frac{1}{3(3+3)+(-5)(-2)}\begin{pmatrix} p+3 & 5 \\ 2 & p \end{pmatrix}$
	Note	Allow B0 M1 A0 for just writing $\frac{1}{p(p+3)\pm(-5)(-2)}\begin{pmatrix} p+3 & 5 \\ 2 & p \end{pmatrix}$
	Note	Allow M1 for evidence of a correct numerical expression for $\det\mathbf{A}=ad\pm(-5)(-2)$ followed by $\frac{1}{\text{their det}(A)}\text{Adj}(\mathbf{A})$ where a correct method has been employed for finding their $\text{Adj}(\mathbf{A})$
	Note	Give final A0 for $\frac{1}{18-10}\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$ without reference to $\frac{1}{8}\begin{pmatrix} 6 & 5 \\ 2 & 3 \end{pmatrix}$ or any other acceptable answer
	Note	Give B1 M1 A1 for writing down a correct final answer for $\mathbf{A}^{-1}$ from no working