No	Soal	No	Cara Maple

1	Misalkan
	$K=\begin{bmatrix}3 & -2 & 7\\ 6 & 5 & 4\\ 0 & 4 & 9\end{bmatrix}$ dan
	$L=\begin{bmatrix}6 & -2 & 4\\ 0 & 1 & 3\\ 7 & 7 & 5\end{bmatrix}$.
	Gunakan metode submatriks tentukan:
	(a) Baris pertama dari KL
		A	`> restart;`
			`> with(linalg):`
			`> K:=matrix(3,3,[3,-2,7,6,5,4,0,4,9]);`
			`> L:=matrix(3,3,[6,-2,4,0,1,3,7,7,5]);`
			`> K1:=submatrix(K,[1],[1,2,3]);`
			$K1 := \begin{bmatrix}3 & -2 & 7\end{bmatrix}$
			`> evalm(K.L);` $\begin{bmatrix}67 & 41 & 41\\ 64 & 21 & 59\\ 63 & 67 & 57\end{bmatrix}$
			`> evalm(K1.L);` $\begin{bmatrix}67 & 41 & 41\end{bmatrix}$

	(b) Kolom pertama dari LK	B	`> evalm(L.K);` $\begin{bmatrix}6 & -6 & 70\\ 6 & 17 & 31\\ 63 & 41 & 122\end{bmatrix}$ `> K2:=submatrix(K,[1,2,3],[1]);` $K2 := \begin{bmatrix}3\\ 6\\ 0\end{bmatrix}$ `> evalm(L.K2);` $\begin{bmatrix}6\\ 6\\ 63\end{bmatrix}$

2	Tentukan suatu operasi baris yang akan mengembalikan matriks elementer di bawah ini menjadi matriks identitas.
	$\begin{bmatrix}1 & 0\\ -3 & 1\end{bmatrix}$
			`> restart;`
			`> with(linalg):`
			`> A:=matrix(2,2,[1,0,-3,1]);`
			`> H21_(3):=addrow(A,1,2,3);`
			$H21\_(3) := \begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

3	Gunakan aturan Crammer untuk menyelesaikan x, tanpa perlu menyelesaikan y, z dan w.
	$4x+y+z+w=6$
	$3x+7y-z+w=1$
	$7x+3y-5z+8w=-3$
	$x+y+z+2w=3$
			`> restart;`
			`> with(linalg);`
			`> spl:={4*x+y+z+w=6,3*x+7*y-z+w=1,7*x+3*y-5*z+8*w=-3,x+y+z+2*w=3};`
			$spl := \{4x+y+z+w=6, 3x+7y-z+w=1, x+y+z+2w=3, 7x+3y-5z+8w=-3\}$
			`> M:=genmatrix(spl,[x,y,z,w],flag);`
			`> A:=submatrix(M,[1,2,3,4],[1,2,3,4]);`
			`> Ax:=submatrix(M,[1,2,3,4],[5,2,3,4]);`
			`> x:=det(Ax)/det(A);`
			$x := 1$

4	Gunakan matriks adjoin untuk menentukan invers matriks berikut
	$P=\begin{bmatrix}3 & 1\\ 5 & 2\end{bmatrix}$
			`> restart;`
			`> with(linalg);`
			`> P:=matrix(2,2,[3,1,5,2]);` $P := \begin{bmatrix}3 & 1\\ 5 & 2\end{bmatrix}$
			`> adj(P);` $\begin{bmatrix}2 & -1\\ -5 & 3\end{bmatrix}$
			`> det(P);` 1
			`> A_invers:=(1/det(P).adj(P));`
			$A\_invers := \begin{bmatrix}2 & -1\\ -5 & 3\end{bmatrix}$

No	Soal	No	Cara Maple

1	Misalkan
	$K=\begin{bmatrix}3&-2&7\\6&5&4\\0&4&9\end{bmatrix}$ dan
	$L=\begin{bmatrix}6&-2&4\\0&1&3\\7&7&5\end{bmatrix}$. Gunakan metode submatriks tentukan:
	(a) Baris ketiga dari KL
		A	`> restart;`
			`> with(linalg):`
			`> K:=matrix(3,3,[3,-2,7,6,5,4,0,4,9]);`
			`> L:=matrix(3,3,[6,-2,4,0,1,3,7,7,5]);`
			`> K1:=submatrix(K,[3],[1,2,3]);`
			$K1:=\begin{bmatrix}0&4&9\end{bmatrix}$
			`> evalm(K.L);` $\begin{bmatrix}67&41&41\\64&21&59\\63&67&57\end{bmatrix}$
			`> evalm(K1.L);` $\begin{bmatrix}63&67&57\end{bmatrix}$

	(b) Kolom kedua dari KL	B	`> L2:=submatrix(L,[1,2,3],[2]);` $L2:=\begin{bmatrix}-2\\1\\7\end{bmatrix}$ `> evalm(K.L2);` $\begin{bmatrix}41\\21\\67\end{bmatrix}$

2	Tentukan suatu operasi baris yang akan mengembalikan matriks elementer di bawah ini menjadi matriks identitas.
	$\begin{bmatrix}1&0&0\\0&1&0\\0&0&3\end{bmatrix}$
			`> restart;`
			`> with(linalg):`
			`> A:=matrix(3,3,[1,0,0,0,1,0,0,0,3]);`
			`> H3_(1/3):=mulrow(A,3,1/3);`
			$H3\_\left(\frac{1}{3}\right):=\begin{bmatrix}1&0&0\\0&1&0\\0&0&1\end{bmatrix}$

3	Jika $P=\begin{bmatrix}P_{11}&P_{12}\\0&P_{22}\end{bmatrix}$ adalah matriks blok “segitiga atas”, dimana P_{11} dan P_{22} adalah matriks bujursangkar, maka det(P) = det (P_{11}).det (P_{22}), gunakan hasil ini untuk menghitung det (P) untuk:
	$P=\left[\begin{array}{cc\|ccc}2&-1&2&5&6\\4&3&-1&3&4\\\hline 0&0&1&3&5\\0&0&-2&6&2\\0&0&3&5&2\end{array}\right]$
			`> restart;`
			`> with(linalg);`
			`> P:=matrix(5,5,[2,-1,2,5,6,4,3,-1,3,4,0,0,1,3,5,0,0,-2,6,2,0,0,3,5,2]);`
			`> P11:=submatrix(P,[1,2],[1,2]);`
			`> P22:=submatrix(P,[3,4,5],[3,4,5]);`
			`> A:=det(P);`
			$A:=-1080$
			`> K:=det(P11).det(P22);`
			$K:=-1080$

4	Gunakan matriks elementer untuk menentukan invers matriks berikut
	$P=\begin{bmatrix}3&1\\5&2\end{bmatrix}$
			`> restart;`
			`> with(linalg);`
			`> P:=matrix(2,2,[3,1,5,2]);`
			`> Id:=LinearAlgebra:-IdentityMatrix(2,2);`
			`> augment(P,Id);` $\begin{bmatrix}3&1&1&0\\5&2&0&1\end{bmatrix}$
			`> gaussjord(%);` $\begin{bmatrix}1&0&2&-1\\0&1&-5&3\end{bmatrix}$

No	Soal	No	Cara Maple

1	Misalkan
	$K=\begin{bmatrix}3 & -2 & 7\\ 6 & 5 & 4\\ 0 & 4 & 9\end{bmatrix}$ dan
	$L=\begin{bmatrix}6 & -2 & 4\\ 0 & 1 & 3\\ 7 & 7 & 5\end{bmatrix}$. Gunakan metode submatriks tentukan:
	(a) Baris ketiga dari KK
		A	`> restart;`
			`> with(linalg):`
			`> K:=matrix(3,3,[3,-2,7,6,5,4,0,4,9]);`
			`> L:=matrix(3,3,[6,-2,4,0,1,3,7,7,5]);`
			`> K1:=submatrix(K,[3],[1,2,3]);`
			$K1:=\begin{bmatrix}0 & 4 & 9\end{bmatrix}$
			`> evalm(K.K);` $\begin{bmatrix}-3 & 12 & 76\\ 48 & 29 & 98\\ 24 & 56 & 97\end{bmatrix}$
			`> evalm(K1.K);` $\begin{bmatrix}24 & 56 & 97\end{bmatrix}$

	(b) Kolom kedua dari LK	B	`> evalm(L.K);` $\begin{bmatrix}6 & -6 & 70\\ 6 & 17 & 31\\ 63 & 41 & 122\end{bmatrix}$ `> L2:=submatrix(L,[2],[1,2,3]);` $L2:=\begin{bmatrix}0 & 1 & 3\end{bmatrix}$ `> evalm(L2.K);` $\begin{bmatrix}6 & 17 & 31\end{bmatrix}$

2	Tentukan suatu operasi baris yang akan mengembalikan matriks elementer di bawah ini menjadi matriks identitas.
	$\begin{bmatrix}0 & 0 & 0 & 1\\ 0 & 1 & 0 & 0\\ 0 & 0 & 1 & 0\\ 1 & 0 & 0 & 0\end{bmatrix}$
			`> restart;`
			`> with(linalg):`
			`>`
			`A:=matrix(4,4,[0,0,0,1,0,1,0,0,0,0,1,0,1,0,0,0]);`
			`> H41:=swaprow(A,4,1);`
			$H41:=\begin{bmatrix}1 & 0 & 0 & 0\\ 0 & 1 & 0 & 0\\ 0 & 0 & 1 & 0\\ 0 & 0 & 0 & 1\end{bmatrix}$

3	Gunakan aturan Crammer untuk menyelesaikan z, tanpa perlu menyelesaikan x, y dan w.
	$4x+y+z+w=6$
	$3x+7y-z+w=1$
	$7x+3y-5z+8w=-3$
	$x+y+z+2w=3$
			`> restart;`
			`> with(linalg);`
			`> spl:={4*x+y+z+w=6,3*x+7*y-z+w=1,7*x+3*y-5*z+8*w=-3,x+y+z+2*w=3};`
			$spl:=\{4x+y+z+w=6,\ 3x+7y-z+w=1,\ x+y+z+2w=3,\ 7x+3y-5z+8w=-3\}$
			`> M:=genmatrix(spl,[x,y,z,w],flag);`
			`> A:=submatrix(M,[1,2,3,4],[1,2,3,4]);`
			`> Az:=submatrix(M,[1,2,3,4],[1,2,5,4]);`
			`> z:=det(Az)/det(A);`
			$z:=2$

4	Gunakan informasi yang digunakan untuk mencari A
	$A^{-1}=\begin{bmatrix}2 & -1\\ 3 & 5\end{bmatrix}$
			`> restart;`
			`> with(linalg);`
			`> A_inv:=matrix(2,2,[2,-1,3,5]);`
			`> A:=inverse(A_inv);` $A:=\begin{bmatrix}\frac{5}{13} & \frac{1}{13}\\ \frac{-3}{13} & \frac{2}{13}\end{bmatrix}$
			`> evalm(A.A_inv);` $\begin{bmatrix}1 & 0\\ 0 & 1\end{bmatrix}$

No	Soal	No	Cara Maple

1	Jika P dan Q dipartisi menjadi sejumlah submatriks, misalnya:
	$P=\left[\begin{array}{cc} P_{11} & P_{12} \\ \hline P_{21} & P_{22}\end{array}\right]$ dan $Q=\left[\begin{array}{cc} Q_{11} & Q_{12} \\ \hline Q_{21} & Q_{22}\end{array}\right]$
	$PQ=\left[\begin{array}{cc} P_{11}Q_{11}+P_{12}Q_{21} & P_{11}Q_{12}+P_{12}Q_{22} \\ \hline P_{21}Q_{11}+P_{22}Q_{21} & P_{21}Q_{12}+P_{22}Q_{22}\end{array}\right]$
	$P=\left[\begin{array}{cccc} -1 & 2 & 1 & 5 \\ 0 & -3 & 4 & 2 \\ \hline 1 & 5 & 6 & 1\end{array}\right]$
	$Q=\left[\begin{array}{ccc} 2 & 1 & 4 \\ -3 & 5 & 2 \\ \hline 7 & -1 & 5 \\ 0 & 3 & -3\end{array}\right]$
	Tentukan elemen $P_{11}Q_{11}+P_{12}Q_{21}$
			`> with(linalg);`
			`> P:=matrix(3,4,[-1,2,1,5,0,-3,4,2,1,5,6,1]);`
			`> Q:=matrix(4,3,[2,1,4,-3,5,2,7,-1,5,0,3,-3]);`
			`> P11:=submatrix(P,[1,2],[1,2]);`
			`> Q12:=submatrix(Q,[1,2],[1,2]);`
			`> P12:=submatrix(P,[1,2],[3,4]);`
			`> Q21:=submatrix(Q,[3,4],[1,2]);`
			`> evalm(P11.Q12+P12.Q21);`
			$\begin{bmatrix} -1 & 23 \\ 37 & -13\end{bmatrix}$

2	Tentukan suatu operasi baris yang akan mengembalikan matriks elementer di bawah ini menjadi matriks identitas.
	$\begin{bmatrix} 1 & 0 & -\frac{1}{7} & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1\end{bmatrix}$
			`> restart;`
			`> with(linalg);`
			`> A:=matrix(4,4,[1,0,-1/7,0,0,1,0,0,0,0,1,0,0,0,0,1]);`
			`> H13_(1/7):=addrow(A,3,1,1/7);`
			$H13\_\left(\frac{1}{7}\right) := \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1\end{bmatrix}$

3	Tanpa melakukan perhitungan langsung, tunjukkan bahwa $x=0$ dan $x=2$, memenuhi:
	$\begin{vmatrix} x^2 & x & 2 \\ 2 & 1 & 1 \\ 0 & 0 & -5\end{vmatrix}=0$
			`> restart;`
			`> with(linalg);`
			`> A:=matrix(3,3,[x^2,x,2,2,1,1,0,0,-5]);`
			$A := \begin{bmatrix} x^2 & x & 2 \\ 2 & 1 & 1 \\ 0 & 0 & -5\end{bmatrix}$
			`> det(A);`
			$-5x^2+10x$
			`> solve(%);`
			$0, 2$

4	Gunakan informasi yang digunakan untuk mencari P
	$(7A)^{-1}=\begin{bmatrix} -3 & 7 \\ 1 & -2\end{bmatrix}$
			`> restart;`
			`> with(linalg);`
			`> inv:=matrix(2,2,[-3,7,1,-2]);`
			`> A:=inverse(inv);`
			$A := \begin{bmatrix} 2 & 7 \\ 1 & 3\end{bmatrix}$
			`> evalm(1/7*A);`
			$\begin{bmatrix} \frac{2}{7} & 1 \\ \frac{1}{7} & \frac{3}{7}\end{bmatrix}$

<table>
<tr><th>No</th><th>Soal</th><th>No</th><th>Cara Maple</th></tr>
<tr><td>1</td><td>Jika P dan Q dipartisi menjadi sejumlah submatriks, misalnya:
$P=\left[\begin{array}{c|c} P_{11} & P_{12} \\ \hline P_{21} & P_{22} \end{array}\right]$ dan $Q=\left[\begin{array}{c|c} Q_{11} & Q_{12} \\ \hline Q_{21} & Q_{22} \end{array}\right]$
$PQ=\left[\begin{array}{c|c} P_{11}Q_{11}+P_{12}Q_{21} & P_{11}Q_{12}+P_{12}Q_{22} \\ \hline P_{21}Q_{11}+P_{22}Q_{21} & P_{21}Q_{12}+P_{22}Q_{22} \end{array}\right]$
$P=\left[\begin{array}{cc|cc} -1 & 2 & 1 & 5 \\ 0 & -3 & 4 & 2 \\ \hline 1 & 5 & 6 & 1 \end{array}\right]$
$Q=\left[\begin{array}{cc|c} 2 & 1 & 4 \\ -3 & 5 & 2 \\ \hline 7 & -1 & 5 \\ 0 & 3 & -3 \end{array}\right]$
Tentukan elemen $P_{11}Q_{12}+P_{12}Q_{22}$</td><td></td><td><code>> with(linalg);</code>
<code>> P:=matrix(3,4,[-1,2,1,5,0,-3,4,2,1,5,6,1]);</code>
<code>> Q:=matrix(4,3,[2,1,4,-3,5,2,7,-1,5,0,3,-3]);</code>
<code>> P11:=submatrix(P,[1,2],[1,2]);</code>
<code>> Q12:=submatrix(Q,[1,2],[1,2]);</code>
<code>> P12:=submatrix(P,[1,2],[3,4]);</code>
<code>> Q22:=submatrix(Q,[3,4],[2,3]);</code>
<code>> evalm(P11.Q12+P12.Q22);</code>
$$\begin{bmatrix} 6 & -1 \\ 11 & -1 \end{bmatrix}$$</td></tr>
<tr><td>2</td><td>Perhatikan matriks-matriks
$K=\begin{bmatrix} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 8 & 1 & 5 \end{bmatrix}$, $L=\begin{bmatrix} 8 & 1 & 5 \\ 2 & -7 & -1 \\ 3 & 4 & 1 \end{bmatrix}$
Tentukan matriks elementer E_1 sedemikian rupa sehingga
$E_1K = L$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> K:=matrix(3,3,[3,4,1,2,-7,-1,8,1,5]);</code>
<code>> L:=matrix(3,3,[8,1,5,2,-7,-1,3,4,1]);</code>
<code>> E1:=evalm(L.inverse(K));</code>
$$E1 := \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$$
<code>> equal((E1.A),B);</code>
<code>true</code></td></tr>
<tr><td>3</td><td>Untuk nilai k berapakah A tidak dapat dibalik?
$$A=\begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 6 \\ k & 3 & 2 \end{bmatrix}$$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> A:=matrix(3,3,[1,2,4,3,1,6,k,3,2]);</code>
$$A := \begin{bmatrix} 1 & 2 & 4 \\ 3 & 1 & 6 \\ k & 3 & 2 \end{bmatrix}$$
<code>> det(A);</code>
$$8+8k$$
<code>> solve(%);</code>
-1</td></tr>
<tr><td>4</td><td>Tentukan A^2, A^{-2} dari matriks berikut:
$A=\begin{bmatrix} 1 & 0 \\ 0 & -2 \end{bmatrix}$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> A:=matrix(2,2,[1,0,0,-2]);</code>
<code>> A2:=evalm(A.A);</code>
$$A2 := \begin{bmatrix} 1 & 0 \\ 0 & 4 \end{bmatrix}$$
<code>> inverse(A2);</code>
$$\begin{bmatrix} 1 & 0 \\ 0 & \frac{1}{4} \end{bmatrix}$$</td></tr>
</table>

<table>
<tr><th>No</th><th>Soal</th><th>No Cara Maple</th></tr>
<tr><td>1</td><td>Jika P dan Q dipartisi menjadi sejumlah submatriks, misalnya:
$P=\left[\begin{array}{c|c} P_{11} & P_{12} \\ \hline P_{21} & P_{22} \end{array}\right]$ dan $Q=\left[\begin{array}{c|c} Q_{11} & Q_{12} \\ \hline Q_{21} & Q_{22} \end{array}\right]$
$PQ=\left[\begin{array}{c|c} P_{11}Q_{11}+P_{12}Q_{21} & P_{11}Q_{12}+P_{12}Q_{22} \\ \hline P_{21}Q_{11}+P_{22}Q_{21} & P_{21}Q_{12}+P_{22}Q_{22} \end{array}\right]$
$P=\left[\begin{array}{cc|cc} -1 & 2 & 1 & 5 \\ 0 & -3 & 4 & 2 \\ \hline 1 & 5 & 6 & 1 \end{array}\right]$
$Q=\left[\begin{array}{cc|c} 2 & 1 & 4 \\ -3 & 5 & 2 \\ \hline 7 & -1 & 5 \\ 0 & 3 & -3 \end{array}\right]$
Tentukan elemen $P_{11}Q_{12}+P_{12}Q_{22}$</td><td><code>> with(linalg);</code>
<code>> P:=matrix(3,4,[-1,2,1,5,0,-3,4,2,1,5,6,1]);</code>
<code>> Q:=matrix(4,3,[2,1,4,-3,5,2,7,-1,5,0,3,-3]);</code>
<code>> P11:=submatrix(P,[1,2],[1,2]);</code>
<code>> Q12:=submatrix(Q,[1,2],[3]);</code>
<code>> P12:=submatrix(P,[1,2],[3,4]);</code>
<code>> Q22:=submatrix(Q,[3,4],[3]);</code>
<code>> evalm(P11.Q12+P12.Q22);</code>
$\begin{bmatrix} -10 \\ 8 \end{bmatrix}$</td></tr>
<tr><td>2</td><td>Perhatikan matriks-matriks
$K=\begin{bmatrix} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 8 & 1 & 5 \end{bmatrix}$, $L=\begin{bmatrix} 8 & 1 & 5 \\ 2 & -7 & -1 \\ 3 & 4 & 1 \end{bmatrix}$
Tentukan matriks elementer E_2 sedemikian rupa sehingga
$E_2L = K$</td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> K:=matrix(3,3,[3,4,1,2,-7,-1,8,1,5]);</code>
<code>> L:=matrix(3,3,[8,1,5,2,-7,-1,3,4,1]);</code>
<code>> E2:=evalm(K.inverse(L));</code>
$E2 := \begin{bmatrix} 0 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 0 \end{bmatrix}$
<code>> equal((E2.L),K);</code>
true</td></tr>
<tr><td>3</td><td>Gunakan aturan Crammer untuk menyelesaikan w, tanpa perlu menyelesaikan x, y dan z.
$4x+y+z+w=6$
$3x+7y-z+w=1$
$7x+3y-5z+8w=-3$
$x+y+z+2w=3$</td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> spl:={4*x+y+z+w=6,3*x+7*y-z+w=1,7*x+3*y-5*z+8*w=-3,x+y+z+2*w=3};</code>
$spl := \{4x+y+z+w=6,\ 3x+7y-z+w=1,\ x+y+z+2w=3,\ 7x+3y-5z+8w=-3\}$
<code>> M:=genmatrix(spl,[x,y,z,w],flag);</code>
<code>> A:=submatrix(M,[1,2,3,4],[1,2,3,4]);</code>
<code>> Aw:=submatrix(M,[1,2,3,4],[1,2,3,5]);</code>
<code>> w:=det(Aw)/det(A);</code>
$w := 0$</td></tr>
<tr><td>4</td><td>Gunakan matriks adjoin untuk menentukan invers matriks berikut:
$\begin{bmatrix} 2 & -3 \\ 4 & 4 \end{bmatrix}$</td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> C:=matrix(2,2,[2,-3,4,4]);</code>
<code>> det(C);</code>
20
<code>> adj(C);</code>
$\begin{bmatrix} 4 & 3 \\ -4 & 2 \end{bmatrix}$
<code>>inv_C:=evalm(1/det(C).adj(C));</code>
$inv\_C := \begin{bmatrix} \frac{1}{5} & \frac{3}{20} \\ \frac{-1}{5} & \frac{1}{10} \end{bmatrix}$</td></tr>
</table>

<table>
<tr><th>No</th><th>Soal</th><th>No</th><th>Cara Maple</th></tr>
<tr><td>1</td><td>Jika P dan Q dipartisi menjadi sejumlah submatriks, misalnya:
$P=\left[\begin{array}{c|c} P_{11} & P_{12} \\ \hline P_{21} & P_{22}\end{array}\right]$ dan $Q=\left[\begin{array}{c|c} Q_{11} & Q_{12} \\ \hline Q_{21} & Q_{22}\end{array}\right]$
$PQ=\left[\begin{array}{c|c} P_{11}Q_{11}+P_{12}Q_{21} & P_{11}Q_{12}+P_{12}Q_{22} \\ \hline P_{21}Q_{11}+P_{22}Q_{21} & P_{21}Q_{12}+P_{22}Q_{22}\end{array}\right]$
$P=\left[\begin{array}{cc|cc} -1 & 2 & 1 & 5 \\ 0 & -3 & 4 & 2 \\ \hline 1 & 5 & 6 & 1\end{array}\right]$
$Q=\left[\begin{array}{cc|c} 2 & 1 & 4 \\ -3 & 5 & 2 \\ \hline 7 & -1 & 5 \\ 0 & 3 & -3\end{array}\right]$
Tentukan elemen $P_{21}Q_{11}+P_{22}Q_{21}$</td><td></td><td><code>> with(linalg);</code>
<code>> P:=matrix(3,4,[-1,2,1,5,0,-3,4,2,1,5,6,1]);</code>
<code>> Q:=matrix(4,3,[2,1,4,-3,5,2,7,-1,5,0,3,-3]);</code>
<code>> P21:=submatrix(P,[3],[1,2]);</code>
<code>> Q11:=submatrix(Q,[1,2],[1,2]);</code>
<code>> P22:=submatrix(P,[3],[3,4]);</code>
<code>> Q21:=submatrix(Q,[3,4],[1,2]);</code>
<code>> evalm(P21.Q11+P22.Q21);</code>
$\left[\begin{array}{cc} 29 & 23\end{array}\right]$</td></tr>
<tr><td>2</td><td>Perhatikan matriks-matriks
$K=\left[\begin{array}{ccc} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 8 & 1 & 5\end{array}\right]$,
$M=\left[\begin{array}{ccc} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 2 & -7 & 3\end{array}\right]$
Tentukan matriks elementer E_3 sedemikian rupa sehingga $E_3K = M$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> K:=matrix(3,3,[3,4,1,2,-7,-1,8,1,5]);</code>
<code>> M:=matrix(3,3,[3,4,1,2,-7,-1,2,-7,3]);</code>
<code>> E3:=evalm(K.inverse(M));</code>
$E3 := \left[\begin{array}{ccc} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 2 & 0 & 1\end{array}\right]$
<code>> equal((E3.M),K);</code>
true</td></tr>
<tr><td>3</td><td>Jika $P=\left[\begin{array}{cc} P_{11} & P_{12} \\ 0 & P_{22}\end{array}\right]$ adalah matriks blok “segitiga atas”, dimana P_{11} dan P_{22} adalah matriks bujursangkar, maka det(P) = det (P_{11}).det (P_{22}), gunakan hasil ini untuk menghitung det (P) untuk:
$P=\left[\begin{array}{cc|ccc} 2 & -1 & 2 & 5 & 6 \\ 0 & 3 & -1 & 3 & 4 \\ \hline 0 & 0 & 1 & 3 & 5 \\ 0 & 0 & 0 & 6 & 2 \\ 0 & 0 & 0 & 0 & 2\end{array}\right]$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> P:=matrix(5,5,[2,-1,2,5,6,0,3,-1,3,4,0,0,1,3,5,0,0,0,6,2,0,0,0,0,2]);</code>
<code>> P11:=submatrix(P,[1,2],[1,2]);</code>
<code>> P22:=submatrix(P,[3,4,5],[3,4,5]);</code>
<code>> A:=det(P);</code>
$A := 72$
<code>> K:=det(P11).det(P22);</code>
$K := 72$</td></tr>
<tr><td>4</td><td>Gunakan matriks adjoin untuk menentukan invers matriks berikut:
$\left[\begin{array}{cc} 6 & 4 \\ -2 & -1\end{array}\right]$</td><td></td><td><code>> restart;</code>
<code>> with(linalg);</code>
<code>> C:=matrix(2,2,[6,4,2,-1]);</code>
<code>> det(C); -14</code>
<code>> adj(C);</code> $\left[\begin{array}{cc} -1 & -4 \\ -2 & 6\end{array}\right]$
<code>> inv_C:=evalm(1/det(C).adj(C));</code>
$inv\_C := \left[\begin{array}{cc} \frac{1}{14} & \frac{2}{7} \\ \frac{1}{7} & \frac{-3}{7}\end{array}\right]$</td></tr>
</table>

<table>
<tr><th>No</th><th>Soal</th><th>No</th><th>Cara Maple</th></tr>
<tr><td>1</td><td>Jika P dan Q dipartisi menjadi sejumlah submatriks, misalnya:
$P=\left[\begin{array}{c|c} P_{11} & P_{12} \\ \hline P_{21} & P_{22}\end{array}\right]$ dan $Q=\left[\begin{array}{c|c} Q_{11} & Q_{12} \\ \hline Q_{21} & Q_{22}\end{array}\right]$
$PQ=\left[\begin{array}{c|c} P_{11}Q_{11}+P_{12}Q_{21} & P_{11}Q_{12}+P_{12}Q_{22} \\ \hline P_{21}Q_{11}+P_{22}Q_{21} & P_{21}Q_{12}+P_{22}Q_{22}\end{array}\right]$
$P=\left[\begin{array}{cc|cc} -1 & 2 & 1 & 5 \\ 0 & -3 & 4 & 2 \\ \hline 1 & 5 & 6 & 1\end{array}\right]$
$Q=\left[\begin{array}{cc|c} 2 & 1 & 4 \\ -3 & 5 & 2 \\ \hline 7 & -1 & 5 \\ 0 & 3 & -3\end{array}\right]$
Tentukan elemen $P_{21}Q_{12}+P_{22}Q_{22}$</td><td></td><td>> with(linalg);
> P:=matrix(3,4,[-1,2,1,5,0,-3,4,2,1,5,6,1]);
> Q:=matrix(4,3,[2,1,4,-3,5,2,7,-1,5,0,3,-3]);
> P21:=submatrix(P,[3],[1,2]);
> Q12:=submatrix(Q,[1,2],[3]);
> P22:=submatrix(P,[3],[3,4]);
> Q22:=submatrix(Q,[3,4],[3]);
> evalm(P21.Q12+P22.Q22);
$[41]$</td></tr>
<tr><td>2</td><td>Perhatikan matriks-matriks
$K=\begin{bmatrix} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 8 & 1 & 5\end{bmatrix}$,
$M=\begin{bmatrix} 3 & 4 & 1 \\ 2 & -7 & -1 \\ 2 & -7 & 3\end{bmatrix}$
Tentukan matriks elementer E_4 sedemikian rupa sehingga
$E_4K = M$</td><td></td><td>> restart;
> with(linalg);
> K:=matrix(3,3,[3,4,1,2,-7,-1,8,1,5]);
> M:=matrix(3,3,[3,4,1,2,-7,-1,2,-7,3]);
> > E4:=evalm(M.inverse(K));
$E4 := \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ -2 & 0 & 1\end{bmatrix}$
> equal((E4.K),M);
true</td></tr>
<tr><td>3</td><td>Gunakan aturan Crammer untuk menyelesaikan y, tanpa perlu menyelesaikan x, z dan w.
$4x+y+z+w=6$
$3x+7y-z+w=1$
$7x+3y-5z+8w=-3$
$x+y+z+2w=3$</td><td></td><td>> restart;
> with(linalg);
> spl:={4*x+y+z+w=6,3*x+7*y-z+w=1,7*x+3*y-5*z+8*w=-3,x+y+z+2*w=3};
$spl := \{4x+y+z+w=6, 3x+7y-z+w=1, x+y+z+2w=3, 7x+3y-5z+8w=-3\}$
> M:=genmatrix(spl,[x,y,z,w],flag);
> A:=submatrix(M,[1,2,3,4],[1,2,3,4]);
> Ay:=submatrix(M,[1,2,3,4],[1,5,3,4]);
> y:=det(Ay)/det(A); $y := 0$</td></tr>
<tr><td>4</td><td>Gunakan matriks adjoin untuk menentukan invers matriks berikut:
$\begin{bmatrix} 2 & 0 \\ 2 & 3\end{bmatrix}$</td><td></td><td>> restart;
> with(linalg);
> C:=matrix(2,2,[2,0,2,3]);
> det(C); 6
> adj(C);
$\begin{bmatrix} 3 & 0 \\ -2 & 2\end{bmatrix}$
> inv_C:=evalm(1/det(C).adj(C));
$inv\_C := \begin{bmatrix} \frac{1}{2} & 0 \\ \frac{-1}{3} & \frac{1}{3}\end{bmatrix}$</td></tr>
</table>