Roll Nos	Problems							
1-9	A morning newspaper lists the following used-car prices for a foreign compact with age $x_1$ measured in years and selling price $x_2$ measured in thousands of dollars:							
	$x_1 \mid 1  2$	3 3 4	5 6	8 9 11				
	x <sub>2</sub> 18.95 19.00 1	7.95 15.54 14.00	12.95 8.94 7.4	49 6.00 3.99				
	(a) Construct a scatter plot of	the data and mark	ainal dat diaarar					
	<ul> <li>(a) Construct a scatter plot of the data and marginal dot diagrams.</li> <li>(b) Infer the sign of the sample covariance s<sub>12</sub> from the scatter plot.</li> </ul>							
	•				2. Com-			
	(c) Compute the sample means $\bar{x}_1$ and $\bar{x}_2$ and the sample variances $s_{11}$ and $s_{22}$ . Compute the sample covariance $s_{12}$ and the sample correlation coefficient $r_{12}$ . Interpret these quantities.							
							(d) Display the sample mean array $\hat{\mathbf{x}}$ , the sample variance-covariance array $\mathbf{S}_n$ , and the sample correlation array $\mathbf{R}$ u	
	The world's 10 largest compan	ies yield the follo	wing data:		-			
	The World's 10 Largest Companies <sup>1</sup>							
		$x_1 = \text{sales}$	$x_2 = profits$	$x_3 = assets$				
		Company	(billions)	(billions)	(billions)			
	Citigroup General Electric	108.28 152.36	17.05 16.59	1,484.10 750.33				
	American Intl Group	95.04	10.91	766.42				
	Bank of America	65.45	14.14	1,110.46				
	HSBC Group ExxonMobil	62.97 263.99	9.52 25.33	1,031.29 195.26				
	Royal Dutch/Shell	265.19	18.54	193.83				
	BP	285.06	15.73	191.11				
	ING Group Toyota Motor	92.01 165.68	8.10 11.13	1,175.16 211.15				
	<sup>1</sup> From www.Forbes.com partially based on Forber The Forbes Global 2000, April 18, 2005.							
	7.17		(a) Plot the scatter diagram and marginal dot diagrams for variables $x_1$ and $x_2$ . Com-					
	(a) Plot the scatter diagram a		diagrams for vari	iables $x_1$ and $x_2$	. Com-			
	(a) Plot the scatter diagram as ment on the appearance of	the diagrams.		iables $x_1$ and $x_2$	2. Com-			
	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> </ul>	the diagrams.		iables $x_1$ and $x_2$	2. Com-			
	(a) Plot the scatter diagram as ment on the appearance of	the diagrams.		iables $x_1$ and $x_2$	2. Com-			
	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> </ul>	the diagrams. $r_{12}$ , and $r_{12}$ . Inter	pret r <sub>12</sub> .		. Com-			
	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of</li> <li>(b) Compute x  1, x  2, s  1, s  2.</li> <li>(a) Plot the scatter diagrams and do</li> </ul>	t diagrams for $(x_2, x_3)$	pret r <sub>12</sub> .		. Com-			
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute \$\bar{x}_1\$, \$\bar{x}_2\$, \$s_{11}\$, \$s_{22}\$, \$s_{22}\$</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> </ul>	of the diagrams. Interest diagrams for $(x_1, x_2, x_3)$ .	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co		. Com-			
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute \$\bar{x}_1\$, \$\bar{x}_2\$, \$s_{11}\$, \$s_{22}\$, \$s_{22}\$</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the \$\bar{x}\$, \$S_n\$, and \$\bar{x}\$ arrays</li> </ul>	of the diagrams. Interest diagrams for $(x_1, x_2, x_3)$ .	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co		. Com-			
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute \$\bar{x}_1\$, \$\bar{x}_2\$, \$s_{11}\$, \$s_{22}\$, \$s_{22}\$</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the \$\bar{x}\$, \$S_n\$, and \$\bar{x}\$ arrays</li> <li>Given the matrix</li> </ul>	f the diagrams. $r_{12}$ , and $r_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co	omment on				
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decomposition.</li> </ul>	t diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associal	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co	omment on				
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decomment</li> <li>(a) Find A<sup>-1</sup>.</li> </ul>	f the diagrams. $r_{12}$ , and $r_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ And the association of	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$ ted normalized of $\mathbf{A}$ .	omment on				
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decomposition.</li> </ul>	f the diagrams. $r_{12}$ , and $r_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ The association of the associa	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$ ted normalized of $\mathbf{A}$ .	mment on	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram as ment on the appearance of</li> <li>(b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues</li> </ul>	f the diagrams. $r_{12}$ , and $r_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ The association of the associa	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$ ted normalized of $\mathbf{A}$ .	mment on	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> </ul>	f the diagrams. $r_{12}$ , and $r_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ $\mathbf{A}_{12} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the association of the same diagrams for $\mathbf{A}_{12}$ .	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  -2  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .	mment on	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decommon (b) Compute the eigenvalues (c) Write the spectral decommon (d) Find A<sup>-1</sup>.</li> </ul>	f the diagrams. $x_{12}$ , and $x_{12}$ . Interest diagrams for $(x_2, x_3)$ . $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the association of the diagrams for $\mathbf{A}$ .  and eigenvectors are sufficiently as $\mathbf{A} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$ .	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  1  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .  1  4.001  4.002001	eigenvectors e	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decommon (b) Compute the eigenvalues (c) These matrices</li> <li>A =</li></ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate aposition $(x_1, x_2, x_3)$ .  A is an eigenvector of the analysis of $(x_1, x_2, x_3)$ .  A is an eigenvector of $(x_1, x_2, x_3)$ .  A is an eigenvector of $(x_1, x_2, x_3)$ .	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  1  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .  1 4.001 1 4.002001  ence in the $(2, 2)$ early dependent. See	eigenvectors e <sub>1</sub> re it with tha	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decommon (b) Compute the eigenvalues (c) Write the spectral decommon (c) Write the spectral decommon (d) 4.001</li> <li>These matrices are identical except Moreover, the columns of A (and A<sup>-1</sup> = (-3)B<sup>-1</sup>. Consequently, small substantially different inverses.</li> </ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate aposition $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 3 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ are nearly ling of the appearance of the association $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ are nearly ling of the appearance of the association $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ and $\begin{bmatrix} 1 \\ 4 \end{bmatrix}$ are nearly ling of the appearance of the ap	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  2  3. ted normalized of $\mathbf{A}$ .  The of $\mathbf{A}^{-1}$ .  4.001  4.002001  4.002001  ence in the $(2, 2)$ are also dependent. Searly dependent. Searly dependent. Searly dependent.	eigenvectors e <sub>1</sub> re it with that position. Show that —can give	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decord (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decord (c) Write the spectral decord (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decord (b) Consider the matrices</li> <li>A =</li></ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate position of the positive definite if the positive definite	and $(x_1, x_3)$ . Co $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$ ted normalized of $\mathbf{A}$ .  The of $\mathbf{A}^{-1}$ . $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ , and comparate the comparate of the $\begin{bmatrix} 4.001 \\ 1 \end{bmatrix}$ tence in the $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$	eigenvectors e <sub>1</sub> re it with that position. Show that —can give	and $e_2$ .			
10-20	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decommon (b) Compute the eigenvalues (c) Write the spectral decommon (c) Write the spectral decommon (d) 4.001</li> <li>These matrices are identical except Moreover, the columns of A (and A<sup>-1</sup> = (-3)B<sup>-1</sup>. Consequently, small substantially different inverses.</li> </ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate position of the positive definite if the positive definite	and $(x_1, x_3)$ . Co $\begin{bmatrix} 2 \\ -2 \end{bmatrix}$ ted normalized of $\mathbf{A}$ .  The of $\mathbf{A}^{-1}$ . $\begin{bmatrix} -1 \\ 1 \end{bmatrix}$ , and comparate the comparate of the $\begin{bmatrix} 4.001 \\ 1 \end{bmatrix}$ tence in the $\begin{bmatrix} 2 \\ 2 \end{bmatrix}$	eigenvectors e <sub>1</sub> re it with that position. Show that —can give	and $e_2$ .			
	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decommon (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decommon (b) Compute the eigenvalues (c) Write the spectral decommon (c) Write the spectral decommon (d) 4.001 4.002</li> <li>These matrices are identical except Moreover, the columns of A (and A<sup>-1</sup> = (-3)B<sup>-1</sup>. Consequently, small substantially different inverses.</li> <li>A quadratic form x'A x is said to be 1s the quadratic form 3x<sub>1</sub><sup>2</sup> + 3x<sub>2</sub><sup>2</sup> - 2</li> </ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate aposition of the apposition of the ap	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  2  1  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .  1  4.001  1  4.002001  ence in the $(2, 2)$ early dependent. Saused by rounding ematrix $\mathbf{A}$ is positive?	eigenvectors e <sub>1</sub> re it with that position. Show that —can give ive definite.	and $e_2$ .			
10-20 21-29	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decord (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decord (c) Write the spectral decord (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decord (b) Consider the matrices</li> <li>A =</li></ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate position of the properties of the pr	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  2  1  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .  1  4.001  1  4.002001  ence in the $(2, 2)$ early dependent. Saused by rounding ematrix $\mathbf{A}$ is positive?	eigenvectors e <sub>1</sub> re it with that position. Show that —can give	and $e_2$ .			
	<ul> <li>(a) Plot the scatter diagram at ment on the appearance of (b) Compute x̄<sub>1</sub>, x̄<sub>2</sub>, s<sub>11</sub>, s<sub>22</sub>, s</li> <li>2.</li> <li>(a) Plot the scatter diagrams and do the patterns.</li> <li>(b) Compute the x̄, S<sub>n</sub>, and R arrays</li> <li>Given the matrix</li> <li>find the eigenvalues λ<sub>1</sub> and λ Determine the spectral decorn (a) Find A<sup>-1</sup>.</li> <li>(b) Compute the eigenvalues (c) Write the spectral decorn (a) Find A<sup>-1</sup>.</li> <li>(c) Write the spectral decorn (b) Compute the eigenvalues (c) Write the spectral decorn (c) Write the spectral decorn (c) Write the spectral decorn (d) 4.001 4.002</li> <li>These matrices are identical except Moreover, the columns of A (and A<sup>-1</sup> ± (-3)B<sup>-1</sup>. Consequently, small substantially different inverses.</li> <li>A quadratic form x' A x is said to be 1s the quadratic form 3x<sub>1</sub><sup>2</sup> + 3x<sub>2</sub><sup>2</sup> - 2</li> <li>Determine the square-root matrix A<sup>1/2</sup>.</li> </ul>	t diagrams for $(x_2, x_3)$ .  A = $\begin{bmatrix} 1 \\ 2 \end{bmatrix}$ and the associate position of the properties of the pr	pret $r_{12}$ .  3) and $(x_1, x_3)$ . Co  2  2  2  2  1  ted normalized of $\mathbf{A}$ .  rs of $\mathbf{A}^{-1}$ .  1  4.001  1  4.002001  ence in the $(2, 2)$ early dependent. Saused by rounding ematrix $\mathbf{A}$ is positive?	eigenvectors e <sub>1</sub> re it with that position. Show that —can give ive definite.	and $e_2$ .			

	[1 1]				
	$\mathbf{A} = \begin{bmatrix} 1 & 1 \\ 2 & -2 \\ 2 & 2 \end{bmatrix}$				
	(a) Calculate A'A and obtain its eigenvalues and eigenvectors.				
	(b) Calculate AA' and obtain its eigenvalues and eigenvectors. Check that the nonzero eigenvalues are the same as those in part a.				
	(c) Obtain the singular-value decomposition of A.				
30-39	$\mathbf{A} = \begin{bmatrix} 4 & 8 & 8 \\ 3 & 6 & -9 \end{bmatrix}$				
	(a) Calculate AA' and obtain its eigenvalues and eigenvectors.				
	(b) Calculate A'A and obtain its eigenvalues and eigenvectors. Check that the no eigenvalues are the same as those in part a.	onzero			
	(c) Obtain the singular-value decomposition of A.				
	Let X have covariance matrix				
	$\mathbf{\Sigma} = \begin{bmatrix} 4 & 0 & 0 \\ 0 & 9 & 0 \\ 0 & 0 & 1 \end{bmatrix}$				
	<ul> <li>Find</li> <li>(a) Σ<sup>-1</sup></li> <li>(b) The eigenvalues and eigenvectors of Σ.</li> </ul>				
	(c) The eigenvalues and eigenvectors of $\Sigma^{-1}$ .				
40-49	. Let X have covariance matrix				
	$\Sigma = \begin{bmatrix} 25 & -2 & 4 \\ -2 & 4 & 1 \\ 4 & 1 & 9 \end{bmatrix}$				
	(a) Determine $\rho$ and $V^{1/2}$ . (b) Multiply your matrices to check the relation $V^{1/2}\rho V^{1/2} = \Sigma$ .				
	2.				
	(a) Find $\rho_{13}$ .				
	(b) Find the correlation between $X_1$ and $\frac{1}{2}X_2 + \frac{1}{2}X_3$ .				
	You are given the random vector $\mathbf{X}' = [X_1, X_2, X_3, X_4]$ with mean $\boldsymbol{\mu}'_{\mathbf{X}} = [4, 3, 2, 1]$ and variance—covariance matrix	an vector			
	$\mathbf{\Sigma_{x}} = \begin{bmatrix} 3 & 0 & 2 & 2 \\ 0 & 1 & 1 & 0 \\ 2 & 1 & 9 & -2 \\ 2 & 0 & -2 & 4 \end{bmatrix}$				
	Partition X as				
	$\mathbf{X} = \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \end{bmatrix} = \begin{bmatrix} \mathbf{X}^{(1)} \\ \mathbf{X}^{(2)} \end{bmatrix}$	(a) $E(\mathbf{X}^{(1)})$			
	Let	(b) $E(\mathbf{A}\mathbf{X}^{(1)})$			
	$\mathbf{A} = \begin{bmatrix} 1 & 2 \end{bmatrix}  \text{and}  \mathbf{B} = \begin{bmatrix} 1 & -2 \\ 2 & -1 \end{bmatrix}$	(c) Cov(X <sup>(1)</sup> ) (d) Cov(AX <sup>(1)</sup> )			
	and consider the linear combinations $\mathbf{A}\mathbf{X}^{(1)}$ and $\mathbf{B}\mathbf{X}^{(2)}$ . Find  (e) $E(\mathbf{X}^{(2)})$				
	(g) Cov(X <sup>(2)</sup> )				
	(h) Cov ( <b>BX</b> <sup>(2)</sup> ) (i) Cov ( <b>X</b> <sup>(1)</sup> , <b>X</b> <sup>(2)</sup> )				
	(j) $Cov(\mathbf{AX}^{(1)}, \mathbf{BX}^{(2)})$				
	1				

Compulsory		and consider the linear combinations $\mathbf{A}\mathbf{X}^{(1)}$ and $\mathbf{B}\mathbf{X}^{(2)}$ . Find
for all		(a) $E(\mathbf{X}^{(1)})$
group	xercise 2.32, but with <b>X</b> partitioned as	(b) $E(\mathbf{A}\mathbf{X}^{(1)})$
		(c) Cov(X <sup>(1)</sup> ) (d) Cov(AX <sup>(1)</sup> )
	$\mathbf{x} = \begin{bmatrix} X_1 \\ X_2 \\ X_2 \end{bmatrix} = \begin{bmatrix} \mathbf{x}^{(1)} \\ X_2 \end{bmatrix}$	(e) $E(\mathbf{X}^{(2)})$
	$\mathbf{X} = \begin{bmatrix} X_1 \\ X_2 \\ X_3 \\ X_4 \\ X_5 \end{bmatrix} = \begin{bmatrix} \mathbf{X}^{(1)} \\ \mathbf{X}^{(2)} \end{bmatrix}$	(a) $Cov(AX^{(1)})$ (e) $E(X^{(2)})$ (f) $E(BX^{(2)})$
		$(a) \operatorname{Cov}(\mathbf{X}^{(2)})$
	A and B replaced by	$(h) Cov(BX^{(2)})$
	<b>A</b> and <b>B</b> replaced by $\mathbf{A} = \begin{bmatrix} 2 & -1 & 0 \\ 1 & 1 & 3 \end{bmatrix}  \text{and}  \mathbf{B} = \begin{bmatrix} 1 & 2 \\ 1 & -1 \end{bmatrix}$	(i) $Cov(\mathbf{X}^{(1)}, \mathbf{X}^{(2)})$
		(j) Cov(AX''', BX''')