



MATRICES EXERCISES & SOLUTIONS

QUESTIONS

SOLUTIONS

1

Find the order of the following matrices.

$$A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 & 3 \\ 3 & 2 & 5 \end{bmatrix}$$

$$C = \begin{bmatrix} 3 \\ 2 \\ 1 \end{bmatrix} \quad D = \begin{bmatrix} 2 & 4 & 5 \end{bmatrix}$$

- Order of A is 2 by 2
- Order of B is 2 by 3
- Order of C is 3 by 1
- Order of D is 1 by 3

2

Which of the following matrices are equal?

$$A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 3 & 4 \\ 2 & 5 & 6 \\ 3 & 2 & 1 \end{bmatrix} \quad C = \begin{bmatrix} 3 & 2 \\ 2 & 1 \\ 3 & 4 \end{bmatrix}$$

$$D = \begin{bmatrix} 4 & 1 \\ 0 & 1 \end{bmatrix} \quad E = \begin{bmatrix} 2 & 0 & 2 \\ 1 & 1 & 1 \\ 3 & 2 & 0 \end{bmatrix} \quad F = \begin{bmatrix} 1 & 2 \\ 2 & 3 \\ 1 & 2 \end{bmatrix}$$

$$\begin{aligned} A &= D, \\ B &= E, \\ C &= F \end{aligned}$$

3

From the following matrices, identify the square, rectangular, row, column, identity, zero matrices.

$$A = \begin{bmatrix} 2 & 3 \\ 4 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix} \quad C = \begin{bmatrix} 3 & 2 & 1 \end{bmatrix}$$

$$D = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \quad E = \begin{bmatrix} 3 & 2 \\ 1 & 2 \\ 1 & 1 \end{bmatrix} \quad F = \begin{bmatrix} 3 \\ 2 \\ 5 \end{bmatrix}$$

- A = Square Matrix
- B = Identity Matrix
- C = Row Matrix
- D = Zero or Null Matrix
- E = Rectangular Matrix
- F = Column Matrix

4

Find the negative of the following matrices.

$$A = \begin{bmatrix} 2 & 3 \\ 3 & -4 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 3 & -2 \\ 2 & 4 & -1 \end{bmatrix}$$

$$-A = \begin{bmatrix} -2 & -3 \\ -3 & 4 \end{bmatrix}$$

$$-B = \begin{bmatrix} -1 & -3 & 2 \\ -2 & -4 & 1 \end{bmatrix}$$

5

Find the transpose of the following matrices.

$$A = \begin{bmatrix} 3 & 1 \\ 2 & 2 \end{bmatrix} \quad B = \begin{bmatrix} 2 & 2 & 2 \\ 1 & 3 & 1 \end{bmatrix}$$

$$C = \begin{bmatrix} 2 & 3 & 2 \end{bmatrix} \quad D = \begin{bmatrix} 2 & 3 \\ 1 & 2 \\ 3 & 1 \end{bmatrix}$$

$$A^t = \begin{bmatrix} 3 & 2 \\ 1 & 2 \end{bmatrix} \quad B^t = \begin{bmatrix} 2 & 1 \\ 2 & 3 \\ 2 & 1 \end{bmatrix}$$

$$C^t = \begin{bmatrix} 2 \\ 3 \\ 2 \end{bmatrix} \quad D^t = \begin{bmatrix} 2 & 1 & 3 \\ 3 & 2 & 1 \end{bmatrix}$$

6

Find A+B and A-B

$$A = \begin{bmatrix} 2 & 2 \\ 3 & 1 \end{bmatrix} \quad B = \begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix}$$

$$A+B = \begin{bmatrix} 2 & 2 \\ 3 & 1 \end{bmatrix} + \begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix}$$

$$A+B = \begin{bmatrix} 2+3 & 2+2 \\ 3+2 & 1+5 \end{bmatrix} = \begin{bmatrix} 5 & 4 \\ 5 & 6 \end{bmatrix}$$

$$A-B = \begin{bmatrix} 2 & 2 \\ 3 & 1 \end{bmatrix} - \begin{bmatrix} 3 & 2 \\ 2 & 5 \end{bmatrix}$$

$$A-B = \begin{bmatrix} 2-3 & 2-2 \\ 3-2 & 1-5 \end{bmatrix} = \begin{bmatrix} -1 & 0 \\ 1 & -4 \end{bmatrix}$$

Matrix Algebra Exercises And Solutions

David A. Harville



Matrix Algebra Exercises And Solutions:

Matrix Algebra: Exercises and Solutions David A. Harville, 2011-06-27 This book comprises well over three hundred exercises in matrix algebra and their solutions The exercises are taken from my earlier book *Matrix Algebra From a Statistician's Perspective* They have been restated as necessary to make them comprehensible independently of their source To further insure that the restated exercises have this stand alone property I have included in the front matter a section on terminology and another on notation These sections provide definitions descriptions comments or explanatory material pertaining to certain terms and notational symbols and conventions from *Matrix Algebra From a Statistician's Perspective* that may be unfamiliar to a nonreader of that book or that may differ in generality or other respects from those to which he she is accustomed For example the section on terminology includes an entry for scalar and one for matrix These are standard terms but their use herein and in *Matrix Algebra From a Statistician's Perspective* is restricted to real numbers and to rectangular arrays of real numbers whereas in various other presentations a scalar may be a complex number or more generally a member of a field and a matrix may be a rectangular array of such entities Matrix Algebra David A. Harville, 2011-04-01 **The Matrix Algebra Calculator** Charles H. Jepsen, Eugene A. Herman, 1988 **Problems And Solutions In Introductory And Advanced Matrix Calculus (Second Edition)** Yorick Hardy, Willi-hans Steeb, 2016-07-14 This book provides an extensive collection of problems with detailed solutions in introductory and advanced matrix calculus Supplementary problems in each chapter will challenge and excite the reader ideal for both graduate and undergraduate mathematics and theoretical physics students The coverage includes systems of linear equations linear differential equations integration and matrices Kronecker product and vec operation as well as functions of matrices Furthermore specialized topics such as spectral theorem nonnormal matrices and mutually unbiased bases are included Many of the problems are related to applications for group theory Lie algebra theory wavelets graph theory and matrix valued differential forms benefitting physics and engineering students and researchers alike It also branches out to problems with tensors and the hyperdeterminant Computer algebra programs in Maxima and SymbolicC have also been provided **Matrix Algebra From a Statistician's Perspective** David A. Harville, 2006-04-18 A knowledge of matrix algebra is a prerequisite for the study of much of modern statistics especially the areas of linear statistical models and multivariate statistics This reference book provides the background in matrix algebra necessary to do research and understand the results in these areas Essentially self contained the book is best suited for a reader who has had some previous exposure to matrices Solutions to the exercises are available in the author's *Matrix Algebra Exercises and Solutions* *Spatial Linear Models for Environmental Data* Dale L. Zimmerman, Jay M. Ver Hoef, 2024-04-17 Many applied researchers equate spatial statistics with prediction or mapping but this book naturally extends linear models which includes regression and ANOVA as pillars of applied statistics to achieve a more comprehensive treatment of the analysis of spatially autocorrelated data *Spatial Linear*

Models for Environmental Data aimed at students and professionals with a master's level training in statistics presents a unique applied and thorough treatment of spatial linear models within a statistics framework. Two subfields, one called geostatistics and the other called areal or lattice models, are extensively covered. Zimmerman and Ver Hoef present topics clearly using many examples and simulation studies to illustrate ideas. By mimicking their examples and R code, readers will be able to fit spatial linear models to their data and draw proper scientific conclusions. Topics covered include Exploratory methods for spatial data including outlier detection, semi-variograms, Moran's I and Geary's c , Ordinary and generalized least squares regression methods and their application to spatial data, Suitable parametric models for the mean and covariance structure of geostatistical and areal data, Model fitting including inference methods for explanatory variables and likelihood based methods for covariance parameters, Practical use of spatial linear models including prediction, kriging, spatial sampling and spatial design of experiments for solving real world problems. All concepts are introduced in a natural order and illustrated throughout the book using four datasets. All analyses, tables and figures are completely reproducible using open source R code provided at a GitHub site. Exercises are given at the end of each chapter with full solutions provided on an instructor's FTP site supplied by the publisher.

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Elementary Linear Algebra James R. Kirkwood, Bessie H. Kirkwood, 2017-12-15. Elementary Linear Algebra is written for the first undergraduate course. The book focuses on the importance of linear algebra in many disciplines such as engineering, economics, statistics and computer science. The text

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