Linear Algebra Exercises for *Linear Algebra and Its Applications* /David C. Lay. -5th Ed.

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[1]Thanks Donald Knuth for the LaTex

CHAPTER 1 SUPPLEMENTARY EXERCISES

Contents

First document. This is a simple example, with no extra parameters or packages included.

This is the contents.

Matrix Notation:

The following linear system can be compactily recorded in a rectangular array called matrix

$$\begin{cases} x_1 - 2x_2 + x_3 = 0 \\ 2x_2 - 8x_3 = 8 \\ 5x_1 - 5x_3 = 10 \end{cases} \tag{1}$$

The matrix with the coefficients of each variable aligned in columns, the matrix is called the coefficient matrix (or matrix of coefficients) of the linear system.

$$\begin{bmatrix} 1 & -2 & 1 \\ 0 & 2 & -8 \\ 5 & 0 & -5 \end{bmatrix}$$

ex. 1. Mark each statement True or False. Justify each answer. (If true, cite appropriate facts or theorems. If false, explain why or give a counterexample that shows why the statement is not true in every case.

(a) Any system of n linear equations in n variables has at most n solutions.

(b) If a system of linear equations has two different solu- tions, it must have infinitely many solutions.

(c) If a system of linear equations has no free variables, then it has a unique solution.

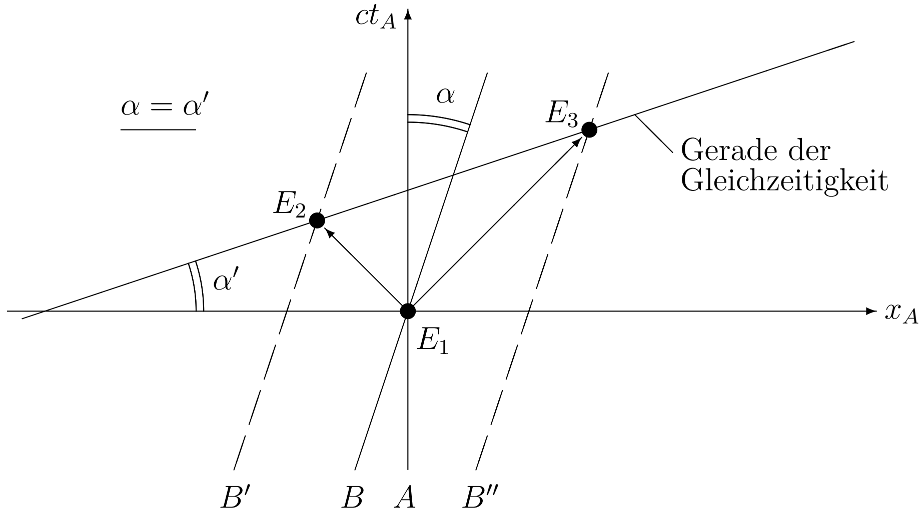
(d) If an augmented matrix $\begin{bmatrix} A & b \end{bmatrix}$ is transformed into $\begin{bmatrix} C & d \end{bmatrix}$ by elementary row operations, then the equa- tions Ax D b and C x D d have exactly the same solu- tion sets.

(e) If a system Ax D b has more than one solution, then so does the system Ax D 0.

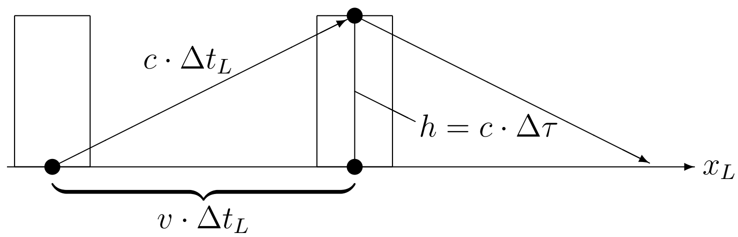
(f) If A is an m n matrix and the equation AxDb is consistent for some b, then the columns of A span R^m.

Ex01 Table

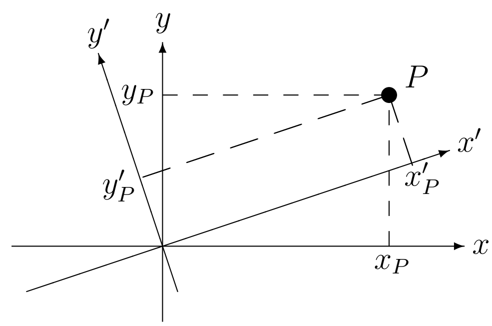
Item	Answer ($)
a	True
b	True
c	True
d	True
e	True
f	True



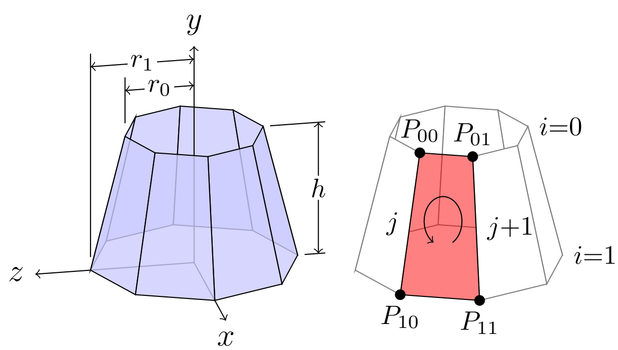
ct_A
$\alpha = \alpha'$
α
E_3
Gerade der
Gleichzeitigkeit
E_2
α'
x_A
E_1
B'
B
A
B''



$c \cdot \Delta t_L$
$h = c \cdot \Delta\tau$
x_L
$v \cdot \Delta t_L$



y'
y
P
y_P
x'
y'_P
x'_P
x
x_P



y
r_1
r_0
h
z
x
P_{00}
P_{01}
i=0
j
j+1
i=1
P_{10}
P_{11}

$$v = v^1 e_1 + v^2 e_2 + v^3 e_3 = v^i e_i, i = 1, 2, 3$$

or

$$v = v^1 e_1 + v^2 e_2 + v^3 e_3 = v^i e_i, i = 1, 2, 3 \tag{2}$$

$f(x) = \sum_{n=0}^{10} \frac{x}{n!}$

$$f(x) = \sum_{n=0}^{10} \frac{x}{n!}$$

In-line math components can be set with independent math display style $\displaystyle f(x) = \sum_{n=0}^{10} \frac{x}{n!}$, and vice versa:

$$\textstyle f(x) = \scriptstyle\sum_{n=0}^{10} \frac{x}{n!}$$

$$x^2 + y^2 = z^2 \tag{3}$$

3

$$x_1, x_2, \cdots, x_N$$

$$\begin{bmatrix} v^i e_i & v^i e_j \\ v^j e_i & v^j e_j \end{bmatrix}$$

$$\left\{ \begin{array}{rcl} (f+g)(x) & = & f(x) + g(x) \\ (\alpha f)(x) & = & \alpha f(x) \\ (fg)(x) & = & f(x) g(x) \end{array} \right.$$

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Table 1: Timeline of something.

1947	AT and T Bell Labs develop the idea of cellular phones.
1968	Xerox Palo Alto Research Centre envisage the ‘Dynabook’.
1971	Busicom ’Handy-LE’ Calculator.
1973	First mobile handset invented by Martin Cooper.
1978	Parker Bros. Merlin Computer Toy.
1981	Osborne 1 Portable Computer.
1982	Grid Compass 1100 Clamshell Laptop.
1983	TRS-80 Model 100 Portable PC.
1984	Psion Organiser Handheld Computer.
1991	Psion Series 3 Minicomputer.

$$
\begin{aligned}
w(0) &= 0 \qquad (4)\\
\left.\frac{\partial w}{\partial x}\right|_{x=0} &= 0 \qquad (5)\\
& \qquad (6)
\end{aligned}
$$

$$s = \int_a^b |\dot{x}(t)| dt$$

$$r'(t) = \lim_{\triangle t \to 0} \frac{r(t + \triangle t) - r(t)}{\triangle t}$$

$$\left.\frac{\partial w}{\partial x}\right|_{x=0} = 0$$

The square root of 100 is $\sqrt{100} = 10$.
The cubic root of 64 is $\sqrt[3]{64} = 4$.
3

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[3]

Bibliography

[1] Helmut Kopka and Patrick W. Daly. *A Guide to LaTeX* . Addison-Wesley, Fourth edition, 2004.

[2] Michel Goossens, Frank Mittelbach, and Alexander Samarin. *The LaTeX Companion*. Addison-Wesley, Reading, Massachusetts, 1993.

[3] Albert Einstein. *Zur Elektrodynamik bewegter Körper*. (German) [*On the electrodynamics of moving bodies*]. Annalen der Physik, 322(10):891–921, 1905.

$$\begin{pmatrix} a11 & a12 & a13 \\ a21 & a22 & a23 \end{pmatrix} \tag{7}$$

$$\begin{array}{c c} & \begin{array}{cc} 1 & 2 \end{array} \\ \begin{array}{c} 1 \\ 2 \\ 3 \end{array} & \begin{pmatrix} x1 & x2 \\ x3 & x4 \\ x5 & x6 \end{pmatrix} \end{array}$$

$$\begin{pmatrix} 1 & -2 & 1 & 0 \\ 0 & 1 & -4 & 4 \\ 0 & 0 & 1 & 3 \end{pmatrix} \tag{8}$$

$$\begin{pmatrix} 0 & 1 & -4 & 8 \\ 2 & -3 & 2 & 1 \\ 5 & -8 & 7 & 1 \end{pmatrix} \tag{9}$$

[4] Knuth: Computers and Typesetting,
http://www-cs-faculty.stanford.edu/~uno/abcde.html