

# Chapter 1

## Systems of Linear Equations and Matrices

### Section 1.1

#### Exercise Set 1.1

- 1.** (a), (c), and (f) are linear equations in  $x_1$ ,  $x_2$ , and  $x_3$ .  
 (b) is not linear because of the term  $x_1x_2$ .  
 (d) is not linear because of the term  $x^{-2}$ .  
 (e) is not linear because of the term  $x_1^{2/3}$ .
- 2.** (a) and (d) are linear systems.  
 (b) is not a linear system because the first and second equations are not linear.  
 (c) is not a linear system because the second equation is not linear.
- 3.** By inspection, (a) and (b) are both consistent;  $x_1 = 3$ ,  $x_2 = 2$ ,  $x_3 = -2$ ,  $x_4 = 1$  is a solution of (a) and  $x_1 = 1$ ,  $x_2 = 3$ ,  $x_3 = 2$ ,  $x_4 = 2$  is a solution of (b). Note that both systems have infinitely many solutions.
- 4.** (a), (b), and (c) are solutions.  
 (d) and (e) do not satisfy any of the equations.

**5.** (a)  $7x - 2y = 3$

$$x = \frac{3}{7}y + \frac{3}{7}$$

Let  $y = t$ . The solution is

$$x = \frac{3}{7}t + \frac{3}{7}$$

$$y = t$$

(b)  $-8x_1 + 2x_2 - 3x_3 + 6x_4 = 1$

$$x_1 = \frac{1}{4}x_2 - \frac{3}{8}x_3 + \frac{3}{4}x_4 - \frac{1}{8}$$

Let  $x_2 = r$ ,  $x_3 = s$ , and  $x_4 = t$ . The solution is

$$x_1 = \frac{1}{4}r - \frac{3}{8}s + \frac{3}{4}t - \frac{1}{8}$$

$$x_2 = r$$

$$x_3 = s$$

$$x_4 = t$$

**11.** (a)  $\begin{bmatrix} 2 & 0 & 0 \\ 3 & -4 & 0 \\ 0 & 1 & 0 \end{bmatrix}$  corresponds to

$$\begin{aligned} 2x_1 &= 0 \\ 3x_1 - 4x_2 &= 0 \\ x_2 &= 1 \end{aligned}$$

# Chapter Linear Systems Dsp

**Samuel D. Stearns, Donald R. Hush**



## Chapter Linear Systems Dsp:

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**Digital Signal Processing with Examples in MATLAB®** Samuel D. Stearns, Donald R. Hush, 2016-04-19 Based on fundamental principles from mathematics linear systems and signal analysis digital signal processing DSP algorithms are useful for extracting information from signals collected all around us Combined with today's powerful computing capabilities they can be used in a wide range of application areas including engineering communication

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**Digital Signal Processing System and Its Realization** Yan-Zhong Zhang,Yufen Yao,1993 **Digital Signal Processing** David J. DeFatta,Joseph G. Lucas,William S. Hodgkiss,1988-03-22 Provides a new methodology for performing system design of signal processing applications offering easy to follow procedures which can be implemented on personal computers Topics covered include a structured approach to filter design with closed form equations for classical IIR filter implementations in 2nd order cascaded stages radix 4 overlap FFT processing gain computation procedure and results for popular windows and comprehensive finite arithmetic analysis procedure for cascaded implementations Multirate processing is covered along with a system design of a high resolution detection application showing the procedure for analyzing the hardware and software architecture requirements BASIC routines are provided for several DSP operations *Digital Signal Processing Implementations* Avtar Singh,Srini Srinivasan,2004 Whether you are an engineering student or an engineer already engaged in system design this current book will become your essential companion guiding you in using both hardware and software as you design systems with programmable DSP devices Jacket *Digital Signal Processing Using MATLAB V.4* Vinay K. Ingle,John G. Proakis,1997 Intended to supplement traditional references on digital signal processing

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**for Digital Signal Processing** John G. Proakis,Vinay K. Ingle,2004 *International Journal of Electrical Engineering Education* ,1989 Digital Signal Processing Laboratory Using the ADSP-2101 Microcomputer Vinay K. Ingle,John G. Proakis,1991 A manual on the total system development aspects of the ADSP 2101 microcomputer covering theory and practice Lab experiments outlining the target system description and management of simulator environment and navigation are provided Projects include FIR and IIR filters *Student Manual for Digital Signal Processing with MATLAB* John G. Proakis,Vinay K. Ingle,2007

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