

MATH122 200610 Problem Set 2

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Wednesday, January 18, 2006

The following problems from the exercises in sections 1.2 and 1.3 may appear on the quiz on January 25.

1. (Based on 1.2.4) Reduce the matrix

$$\begin{bmatrix} 1 & 3 & 5 & 7 \\ 3 & 5 & 7 & 9 \\ 5 & 7 & 9 & 1 \end{bmatrix}$$

to row echelon form and then to reduced row echelon form. Identify the pivot positions in the final matrix and in the original matrix, and list the pivot columns.

2. (Based on 1.2.12) Find the general solution of the system represented by the augmented matrix

$$\left[\begin{array}{cccc|c} 1 & -7 & 0 & 6 & 5 \\ 0 & 0 & 1 & -2 & -3 \\ -1 & 7 & -4 & 2 & 7 \end{array} \right]$$

3. (Based on 1.2.20) Choose values for h and k in the following system

$$\begin{aligned} x_1 + 3x_2 &= 2 \\ 3x_1 + hx_2 &= k \end{aligned}$$

such that

- (a) the system has a unique solution;
 - (b) the system has no solution; and
 - (c) the system has infinitely many solutions.
4. (Based on 1.3.12) Determine whether the vector \mathbf{b} is a linear combination of the vectors \mathbf{a}_1 , \mathbf{a}_2 , and \mathbf{a}_3 where

$$\mathbf{a}_1 = \begin{bmatrix} 1 \\ -2 \\ 2 \end{bmatrix}, \quad \mathbf{a}_2 = \begin{bmatrix} 0 \\ 5 \\ 5 \end{bmatrix}, \quad \mathbf{a}_3 = \begin{bmatrix} 2 \\ 0 \\ 8 \end{bmatrix}, \quad \mathbf{b} = \begin{bmatrix} -5 \\ 11 \\ -7 \end{bmatrix}.$$

5. (Based on 1.3.18) For what values of h is \mathbf{y} in the plane spanned by \mathbf{v}_1 and \mathbf{v}_2 where

$$\mathbf{v}_1 = \begin{bmatrix} 1 \\ 0 \\ -2 \end{bmatrix}, \quad \mathbf{v}_2 = \begin{bmatrix} -3 \\ 1 \\ 8 \end{bmatrix}, \quad \mathbf{y} = \begin{bmatrix} h \\ -5 \\ -3 \end{bmatrix}?$$

Other problems which will help you learn the material can be found in section 1.2, practice problems 1–2 and exercises 1–18, 20 (try the odd numbers first), and in section 1.3, practice problem 2 and exercises 1–21. Students who would like obtain an A in the course should also try exercises 1.2.21–32, 1.3.22, and 1.3.32–34.