Linear Algebra

— MA 242 —

Exercise Sheet

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These exercises are recommended, but **do not have to be turned in**. *The solutions will be presented in the first discussion (Wednesday, Jan 30, 2013).*

1. Which of the following are linear equations in x_1, x_2 and x_3 ?

   (a) $x_1 + 5x_2 - \sqrt{2}x_3 = 1$ (b) $x_1 + 3x_2 - x_1x_3 = 2$ (c) $x_1 = -7x_2 - 3x_3$

   (d) $x_1^{-2} + x_2 + 8x_3 = 5$ (e) $x_1^{3/5} - 2x_2 + x_3 = 4$ (f) $\pi x_1 - \sqrt{2}x_2 + \frac{1}{3}x_3 = 7^{1/3}$

2. Given that k is a constant, which of the following are linear equations ?

   (a) $x_1 - x_2 + x_3 = \sin k$ (b) $kx_1 - \frac{1}{k}x_2 = 9$ (c) $2^k x_1 + 7x_2 - x_3 = 0$

3. Find the augmented matrix for each of the following systems of linear equations.

   (a) $3x_1 - 2x_2 = -1, 4x_1 - 5x_2 = 3, 7x_1 - 3x_2 = 2$

   (b) $2x_1 + 2x_3 = 1, 3x_1 - x_2 + 4x_3 = 7, 6x_1 + x_2 - x_3 = 0$

   (c) $x_1 + 2x_2 - x_4 + x_5 = 1, 3x_2 + x_3 - x_5 = 2, x_3 + 7x_4 = 1$

   (d) $x_1 = 1, x_2 = 2, x_3 = 3$

4. For which values of the constant k does the system

$$\begin{aligned} x - y &= 3 \\ 2x - 2y &= k \end{aligned}$$

   have no solution, exactly one solution or infinitely many solutions? Explain your reasoning.